CHAPTER 29

HYDRAULIC POWER

LIST OF EFFECTIVE PAGES

N, R or D indicates pages which are New, Revised or Deleted respectively.

Remove and insert the affected pages and complete the Record of Revisions and the Record of Temporary Revisions as necessary.

CH/SE/SU	C	PAGE	DATE	CH/SE/SU	C	PAGE	DATE
L.E.P.	R	A	Mar 30/01				
L.E.P.	R	1	Mar 30/01				
L.E.P.	R	2	Mar 30/01				
L.E.P.	R	3	Mar 30/01				
L.E.P.	R	4	Mar 30/01				
L.E.P.	R	5	Mar 30/01				
L.E.P.	R	6	Mar 30/01				
L.E.P.	R	7	Mar 30/01				
L.E.P.	R	8	Mar 30/01				
L.E.P.	R	9	Mar 30/01				
L.E.P.	R	10	Mar 30/01				

PRINTED IN ENGLAND

CHAPTER 29

HYDRAULIC POWER

LIST OF EFFECTIVE PAGES

N, R or D indicates pages which are New, Revised or Deleted respectively.

Remove and insert the affected pages and complete the Record of Revisions and the Record of Temporary Revisions as necessary.

CH/SE/SU	C	PAGE	DATE	CH/SE/SU	C	PAGE	DATE
S.B.LIST		1	May 30/81	29-00-00		13	Nov 30/77
S.B.LIST		2	Feb 28/81	29-00-00		14	Mar 29/96
S.B.LIST		3	Feb 28/81	29-00-00		14A	Mar 29/96
S.B.LIST		4	May 30/81	29-00-00		14B	Mar 29/96
S.B.LIST		5	Feb 28/81	29-00-00		15	Mar 29/96
S.B.LIST		6	May 30/82	29-00-00		16	Nov 30/77
S.B.LIST		7	May 30/82	29-00-00		17	Nov 30/77
S.B.LIST		8	Nov 30/81	29-00-00		101	Sep 30/86
S.B.LIST		9	Nov 30/81	29-00-00		102	Feb 29/80
T. of C.		1	Mar 31/00	29-00-00		103	Feb 29/80
T. of C.		2	Mar 31/00	29-00-00		104	Feb 29/80
T. of C.		3	Mar 31/00	29-00-00		105	Feb 29/80
T. of C.		4	Mar 31/00	29-00-00		106	Feb 29/80
T. of C.		5	Mar 31/00	29-00-00		107	Feb 29/80
T. of C.		6	Mar 31/00	29-00-00		108	Feb 29/80
T. of C.		7	Mar 31/00	29-00-00		109	Feb 29/80
T. of C.		8	Mar 31/00	29-00-00		110	Feb 29/80
T. of C.		9	Mar 31/00	29-00-00		111	Feb 29/80
T. of C.		10	Mar 31/00	29-00-00		112	Feb 29/80
T. of C.		11	Mar 31/00	29-00-00		113	Feb 29/80
T. of C.		12	Mar 31/00	29-00-00		114	Feb 29/80
				29-00-00		301	Mar 31/99
29-00-00		1	Mar 29/96	29-00-00		302	Mar 31/99
29-00-00		2	Mar 29/96	29-00-00		303	Feb 28/81
29-00-00		3	Mar 29/96	29-00-00		304	Aug 30/76
29-00-00		4	Nov 30/75	29-00-00		305	Feb 28/81
29-00-00		5	Mar 29/96	29-00-00		306	Feb 28/81
29-00-00		6	Mar 29/96	29-00-00		307	Feb 28/81
29-00-00		5A	Mar 29/96	29-00-00		308	Feb 28/81
29-00-00		6A	Mar 29/96	29-00-00		309	Feb 28/81
29-00-00		7	Nov 30/75	29-00-00		310	Nov 30/80
29-00-00		8	Mar 29/96	29-00-00		311	Feb 28/81
29-00-00		8A	Mar 29/96	29-00-00		312	Nov 30/80
29-00-00		8B	Mar 29/96	29-00-00		313	Nov 30/80
29-00-00		9	Nov 30/75	29-00-00		314	Nov 30/80
29-00-00		10	Nov 30/77	29-00-00		315	Mar 31/99
29-00-00		11	Mar 29/96	29-00-00		316	Mar 31/99
29-00-00		12	Mar 29/96	29-00-00		317	Mar 31/99

PRINTED IN ENGLAND

CH/SE/SU	C	PAGE	DATE	CH/SE/SU	C	PAGE	DATE
29-00-00		318	Mar 31/99	29-00-00		437	May 30/81
29-00-00		319	Mar 31/99	29-00-00		438	Feb 28/81
29-00-00		320	Mar 31/99	29-00-00		439	Aug 30/80
29-00-00		321	Mar 31/99	29-00-00		440	Feb 29/80
29-00-00		322	Mar 31/99	29-00-00		441	Feb 29/80
29-00-00		323	Mar 31/99	29-00-00		442	Aug 30/80
29-00-00		324	Mar 31/99	29-00-00		443	Aug 30/80
29-00-00		401	Mar 31/99	29-00-00		501	Feb 29/80
29-00-00		402	Mar 31/99	29-00-00		502	Feb 29/80
29-00-00		403	Mar 29/96	29-00-00		503	Feb 29/80
29-00-00		404	Mar 29/96	29-00-00		504	Feb 29/80
29-00-00		404A	Mar 29/96	29-00-00		505	Feb 29/80
29-00-00		404B	Mar 29/96	29-00-00		601	Aug 30/77
29-00-00		405	Feb 29/80	29-00-00		602	Mar 31/99
29-00-00		406	Feb 29/80	29-00-00		603	Nov 30/81
29-00-00		407	Mar 29/96	29-00-00		604	Mar 31/99
29-00-00		408	Mar 29/96	29-00-00		605	Nov 30/81
29-00-00		409	Mar 29/96	29-00-00		606	Nov 30/81
29-00-00		410	Mar 29/96	29-00-00		607	Nov 30/81
29-00-00		411	Mar 29/96	29-00-00		608	Nov 30/81
29-00-00		412	Mar 29/96	29-00-00		609	Mar 31/99
29-00-00		412A	Mar 29/96	29-00-00		610	Mar 31/99
29-00-00		412B	Mar 29/96	29-00-00		611	Nov 30/81
29-00-00		413	Mar 29/96	29-00-00		612	Nov 30/81
29-00-00		414	Mar 29/96	29-00-00		613	Nov 30/84
29-00-00		415	Feb 29/80	29-00-00		614	Nov 30/84
29-00-00		416	Feb 29/80	29-00-00		615	Nov 30/84
29-00-00		417	Feb 29/80	29-00-00		616	Nov 30/81
29-00-00		418	Feb 29/80	29-00-00		617	Nov 30/81
29-00-00		419	Mar 29/96	29-00-00		618	Nov 30/81
29-00-00		420	Mar 29/96	29-00-00		619	Nov 30/81
29-00-00		420A	Mar 29/96	29-00-00		620	Nov 30/81
29-00-00		420B	Mar 29/96	29-00-00		621	Nov 30/81
29-00-00		421	Feb 29/80	29-00-00		622	Nov 30/81
29-00-00		422	Feb 29/80	29-00-00		623	Nov 30/81
29-00-00		423	Feb 29/80	29-00-00		624	Nov 30/81
29-00-00		424	Feb 29/80	29-00-00		625	Nov 30/81
29-00-00		425	Feb 29/80	29-00-00		626	Nov 30/81
29-00-00		426	Feb 29/80	29-00-00		627	Nov 30/81
29-00-00		427	Feb 29/80	29-00-00		628	Nov 30/81
29-00-00		428	Feb 29/80	29-00-00		629	Nov 30/81
29-00-00		429	Mar 29/96	29-00-00		630	Nov 30/81
29-00-00		430	Mar 29/96	29-00-00		631	Nov 30/81
29-00-00		431	Mar 29/96	29-00-00		632	Nov 30/81
29-00-00		432	Feb 29/80	29-00-00		633	Nov 30/81
29-00-00		433	Feb 29/80	29-00-00		634	Nov 30/81
29-00-00		434	Feb 29/80	29-00-00		635	Nov 30/81
29-00-00		435	May 30/81	29-00-00		636	Nov 30/81
29-00-00		436	Feb 28/81	29-00-00		637	Nov 30/81

PRINTED IN ENGLAND

CH/SE/SU	C	PAGE	DATE	CH/SE/SU	C	PAGE	DATE
29-00-00		638	Nov 30/81	29-00-00		809	Nov 30/80
29-00-00		639	Nov 30/81	29-00-00		810	Nov 30/80
29-00-00		640	Nov 30/81	29-00-00		811	Nov 30/80
29-00-00		641	Nov 30/81	29-00-00		812	Nov 30/80
29-00-00		642	Nov 30/81	29-00-00		813	Nov 30/80
29-00-00		643	Nov 30/81	29-00-00		814	Nov 30/80
29-00-00		644	Nov 30/81				
29-00-00		645	Nov 30/81	29-10-00		1	Nov 30/75
29-00-00		646	Nov 30/81				
29-00-00		647	Nov 30/81	29-11-00		1	Mar 29/96
29-00-00		648	Nov 30/81	29-11-00		2	Mar 29/96
29-00-00		649	Nov 30/81	29-11-00		2A	Mar 29/96
29-00-00		650	Nov 30/81	29-11-00		2B	Mar 29/96
29-00-00		651	Nov 30/81	29-11-00		2C	Mar 29/96
29-00-00		652	Nov 30/81	29-11-00		2D	Mar 29/96
29-00-00		653	Nov 30/81	29-11-00		2E	Mar 29/96
29-00-00		654	Nov 30/81	29-11-00		2F	Mar 29/96
29-00-00		655	Nov 30/81	29-11-00		3	Sep 30/87
29-00-00		656	Nov 30/81	29-11-00		4	Feb 28/81
29-00-00		657	Nov 30/81	29-11-00		5	Feb 28/81
29-00-00		658	Nov 30/81	29-11-00		6	Feb 28/81
29-00-00		659	Nov 30/81	29-11-00		7	Feb 28/81
29-00-00		660	Nov 30/81	29-11-00		8	Feb 28/81
29-00-00		661	Nov 30/81	29-11-00		9	Feb 28/81
29-00-00		662	Nov 30/81	29-11-00		10	Feb 28/81
29-00-00		663	Nov 30/81	29-11-00		11	Feb 28/81
29-00-00		664	Nov 30/81	29-11-00		12	Feb 28/81
29-00-00		665	Nov 30/81	29-11-00		13	Feb 28/81
29-00-00		666	Nov 30/81	29-11-00		14	Feb 28/81
29-00-00		667	Nov 30/81	29-11-00		15	Feb 28/81
29-00-00		668	Nov 30/81	29-11-00		16	Mar 29/96
29-00-00		669	Nov 30/81	29-11-00		16A	Mar 29/96
29-00-00		670	Mar 31/98	29-11-00		16B	Mar 29/96
29-00-00		671	Mar 31/98	29-11-00		17	Mar 29/96
29-00-00		672	Sep 30/87	29-11-00		18	Feb 28/81
29-00-00		673	Mar 29/96	29-11-00		19	Feb 28/81
29-00-00		674	Mar 29/96	29-11-00		20	May 30/82
29-00-00		675	Mar 31/99	29-11-00		21	Feb 28/81
29-00-00		676	Mar 29/96	29-11-00		22	Feb 28/81
29-00-00		677	Mar 29/96	29-11-00		101	Feb 29/80
29-00-00		678	Mar 29/96	29-11-00		102	Feb 29/80
29-00-00		801	Nov 30/78	29-11-00		103	Feb 29/80
29-00-00		802	Nov 30/78	29-11-00		104	May 30/77
29-00-00		803	Nov 30/78	29-11-00		105	May 30/77
29-00-00		804	Nov 30/78	29-11-00		106	May 30/77
29-00-00		805	Feb 29/80	29-11-00		107	May 30/77
29-00-00		806	Feb 29/80	29-11-00		108	May 30/77
29-00-00		807	Mar 31/99	29-11-00		109	May 30/77
29-00-00		808	Nov 30/80	29-11-00		110	May 30/77

CH/SE/SU	C	PAGE	DATE
29-11-00		111	Mar 27/97
29-11-00		112	May 30/77
29-11-00		113	May 30/77
29-11-00		114	May 30/77
29-11-00		115	May 30/77
29-11-00		116	May 30/77
29-11-00		117	May 30/77
29-11-00		118	May 30/77
29-11-00		119	May 30/77
29-11-00		120	May 30/77
29-11-00		121	May 30/77
29-11-00		122	May 30/77
29-11-00		123	May 30/77
29-11-00		124	May 30/77
29-11-00		125	May 30/77
29-11-00		126	May 30/77
29-11-00		127	May 30/77
29-11-00		128	May 30/77
29-11-00		129	May 30/77
29-11-00		301	Aug 30/77
29-11-00		302	Aug 30/77
29-11-00		303	Aug 30/77
29-11-00		304	Feb 29/80
29-11-00		305	Feb 29/80
29-11-00		306	Jun 30/75
29-11-00		307	Feb 29/80
29-11-00		308	Feb 29/80
29-11-00		309	Feb 29/80
29-11-00		310	Feb 29/80
29-11-00		311	Feb 29/80
29-11-00		501	Jun 30/75
29-11-00		502	Nov 30/75
29-11-00		503	Nov 30/75
29-11-41	R	401	Mar 30/01
29-11-41	R	402	Mar 30/01
29-11-41	R	403	Mar 30/01
29-11-41	R	404	Mar 30/01
29-11-41	R	405	Mar 30/01
29-11-41	R	406	Mar 30/01
29-11-41	R	407	Mar 30/01
29-11-42		401	Aug 30/77
29-11-42		402	Nov 30/75
29-11-42		403	Nov 30/75
29-11-42		404	Jun 30/75
29-11-42		405	Jun 30/75
29-11-42		406	Nov 30/75
29-11-42		501	May 30/76
29-11-42		502	May 30/76
29-11-42		503	May 30/76
29-11-42		504	May 30/76
29-11-42		505	May 30/76
29-11-44		401	Nov 30/82
29-11-44		402	Nov 30/82
29-11-44		403	Nov 30/82
29-11-44		404	Mar 31/99
29-11-45		401	Aug 30/77
29-11-45		402	Aug 30/77
29-11-45		403	Aug 30/77
29-11-45		404	Jun 30/75
29-11-45		405	Aug 30/77
29-11-45		406	Aug 30/77
29-11-45		407	Aug 30/77
29-11-52		401	May 30/81
29-11-52		402	May 30/81
29-11-52		403	May 30/77
29-11-52		404	May 30/81
29-11-61		401	Aug 30/77
29-11-61		402	Mar 29/96
29-11-61		403	Sep 30/90
29-11-61		404	Sep 30/90
29-11-61		405	Aug 30/77
29-11-61		406	Nov 30/75
29-11-61		407	Aug 30/77
29-11-62		401	Jun 30/75
29-11-62		402	Jun 30/75
29-11-62		403	Jun 30/75
29-11-62		404	Jun 30/75
29-11-62		405	Jun 30/75
29-11-71		401	Mar 31/99
29-11-71		402	Mar 31/99
29-11-71		403	Mar 31/99
29-11-71		404	Nov 30/84
29-11-71		405	Mar 31/00
29-11-71		406	Mar 31/00
29-11-71		407	Nov 30/84
29-11-71		408	Nov 30/84
29-11-71		409	Nov 30/84
29-11-71		410	Nov 30/84
29-11-71		411	Nov 30/84
29-11-71		412	Mar 31/99
29-11-72	01	401	Aug 30/77
29-11-72	01	402	Aug 30/77
29-11-72	01	403	May 30/77
29-11-72	01	404	Aug 30/77
29-11-72	01	405	Aug 30/77
29-11-73		401	Nov 30/76
29-11-73		402	Nov 30/76
29-11-73		403	May 30/78

PRINTED IN ENGLAND

CH/SE/SU	C	PAGE	DATE	CH/SE/SU	C	PAGE	DATE
29-11-73		404	May 30/78	29-12-00		115	Feb 29/80
29-11-73		405	Aug 30/80	29-12-00		116	Feb 29/80
29-11-73		406	May 30/78	29-12-00		117	Feb 29/80
				29-12-00		118	Feb 29/80
29-12-00		1	Mar 29/96	29-12-00		119	Feb 29/80
29-12-00		2	Mar 29/96	29-12-00		120	Feb 29/80
29-12-00		2A	Mar 29/96	29-12-00		121	Feb 29/80
29-12-00		2B	Mar 29/96	29-12-00		122	Feb 29/80
29-12-00		2C	Mar 29/96	29-12-00		123	Feb 29/80
29-12-00		2D	Mar 29/96	29-12-00		124	Feb 29/80
29-12-00		2E	Mar 29/96	29-12-00		125	Feb 29/80
29-12-00		2F	Mar 29/96	29-12-00		126	Feb 29/80
29-12-00		3	May 30/82	29-12-00		127	Feb 29/80
29-12-00		4	Feb 29/80	29-12-00		128	Feb 29/80
29-12-00		5	Feb 29/80	29-12-00		129	Feb 29/80
29-12-00		6	Feb 29/80	29-12-00		301	Aug 30/77
29-12-00		7	Feb 29/80	29-12-00		302	Aug 30/77
29-12-00		8	Feb 29/80	29-12-00		303	Aug 30/77
29-12-00		9	Feb 29/80	29-12-00		304	Feb 29/80
29-12-00		10	Feb 29/80	29-12-00		305	Feb 29/80
29-12-00		11	Feb 29/80	29-12-00		306	Jun 30/75
29-12-00		12	Nov 30/80	29-12-00		307	Feb 29/80
29-12-00		13	Feb 29/80	29-12-00		308	Feb 29/80
29-12-00		14	Feb 29/80	29-12-00		309	Feb 29/80
29-12-00		15	Feb 29/80	29-12-00		310	Feb 29/80
29-12-00		16	Feb 29/80	29-12-00		311	Aug 30/77
29-12-00		17	Mar 29/96	29-12-00		312	Aug 30/77
29-12-00		18	Mar 29/96	29-12-00		501	Nov 30/75
29-12-00		18A	Mar 29/96	29-12-00		502	Nov 30/75
29-12-00		18B	Mar 29/96	29-12-00		503	Nov 30/75
29-12-00		19	Feb 29/80	29-12-41		401	Aug 30/77
29-12-00		20	Feb 29/80	29-12-41		402	Aug 30/77
29-12-00		21	May 30/81	29-12-41		403	Nov 30/75
29-12-00		22	May 30/82	29-12-41		404	Nov 30/75
29-12-00		23	May 30/82	29-12-41		405	Nov 30/75
29-12-00		101	Feb 29/80	29-12-41		406	Nov 30/75
29-12-00		102	Feb 29/80	29-12-41		407	Nov 30/75
29-12-00		103	Feb 29/80	29-12-42		401	Aug 30/77
29-12-00		104	Feb 29/80	29-12-42		402	Nov 30/75
29-12-00		105	Feb 29/80	29-12-42		403	Nov 30/75
29-12-00		106	Feb 29/80	29-12-42		404	Nov 30/75
29-12-00		107	Feb 29/80	29-12-42		405	Nov 30/75
29-12-00		108	Feb 29/80	29-12-42		406	Nov 30/75
29-12-00		109	Feb 29/80	29-12-42		501	May 30/76
29-12-00		110	Feb 29/80	29-12-42		502	May 30/76
29-12-00		111	Feb 29/80	29-12-42		503	May 30/76
29-12-00		112	Feb 29/80	29-12-42		504	May 30/76
29-12-00		113	Feb 29/80	29-12-42		505	May 30/76
29-12-00		114	Feb 29/80	29-12-44		401	Nov 30/82

PRINTED IN ENGLAND

CH/SE/SU	C	PAGE	DATE	CH/SE/SU	C	PAGE	DATE
29-12-44		402	Nov 30/82	29-13-00		2	Nov 30/75
29-12-44		403	Nov 30/81	29-13-00		3	Nov 30/75
29-12-45		401	Aug 30/77	29-13-00		4	Jun 30/75
29-12-45		402	Aug 30/77	29-13-00		5	Jun 30/75
29-12-45		403	Aug 30/77	29-13-00		6	May 30/76
29-12-45		404	Jun 30/75	29-13-00		7	Nov 30/75
29-12-45		405	Aug 30/77	29-13-00		101	Feb 29/76
29-12-45		406	Aug 30/77	29-13-00		102	Feb 29/76
29-12-45		407	Mar 27/97	29-13-00		103	Feb 29/76
29-12-52		401	Feb 28/77	29-13-00		104	Feb 29/76
29-12-52		402	May 30/77	29-13-00		105	Feb 29/76
29-12-52		403	May 30/77	29-13-00		106	Feb 29/76
29-12-52		404	May 30/77	29-13-00		107	Feb 29/76
29-12-61		401	Aug 30/77	29-13-00		108	Feb 29/76
29-12-61		402	Mar 29/96	29-13-00		109	Feb 29/76
29-12-61		403	Sep 30/90	29-13-00		110	Feb 29/76
29-12-61		404	Sep 30/90	29-13-00		111	Feb 29/76
29-12-61		405	Aug 30/77	29-13-00		112	Feb 29/76
29-12-61		406	Nov 30/75	29-13-00		113	Feb 29/76
29-12-61		407	Aug 30/77	29-13-00		114	Feb 29/76
29-12-62		401	Jun 30/75	29-13-00		115	Feb 29/76
29-12-62		402	Aug 30/75	29-13-00		301	Nov 30/75
29-12-62		403	Aug 30/75	29-13-00		302	Nov 30/75
29-12-62		404	Jun 30/75	29-13-00		303	Nov 30/75
29-12-62		405	Aug 30/75	29-13-00		304	Nov 30/75
29-12-71		401	Mar 31/99	29-13-00		305	Nov 30/75
29-12-71		402	Mar 31/99	29-13-00		501	Aug 30/77
29-12-71		403	Mar 31/99	29-13-00		502	Aug 30/77
29-12-71		404	Nov 30/84	29-13-00		503	Nov 30/75
29-12-71		405	Mar 31/99	29-13-00		504	Aug 30/77
29-12-71		406	Mar 31/99	29-13-00		505	Aug 30/77
29-12-71		407	Nov 30/84	29-13-11		401	Nov 30/80
29-12-71		408	Nov 30/84	29-13-11		402	Nov 30/79
29-12-71		409	Nov 30/84	29-13-11		403	Nov 30/79
29-12-71		410	Nov 30/84	29-13-11		501	Jun 30/75
29-12-71		411	Nov 30/84	29-13-11		502	Jun 30/75
29-12-71		412	Mar 31/99	29-13-11		503	Jun 30/75
29-12-72	01	401	Aug 30/77	29-13-11		601	Jun 30/75
29-12-72	01	402	Aug 30/77	29-13-11		602	Jun 30/75
29-12-72	01	403	May 30/77	29-13-24		401	Jun 30/75
29-12-72	01	404	Aug 30/77	29-13-24		402	Jun 30/75
29-12-72	01	405	Aug 30/77	29-13-24		403	Aug 30/75
29-12-73		401	Nov 30/76				
29-12-73		402	Nov 30/76	29-20-00		1	May 30/82
29-12-73		403	May 30/78				
29-12-73		404	May 30/78	29-21-00		1	Mar 29/96
29-12-73		405	Aug 30/80	29-21-00		2	Jun 30/75
29-12-73		406	May 30/78	29-21-00		3	Mar 29/96
29-13-00		1	Nov 30/75	29-21-00		4	Mar 29/96

PRINTED IN ENGLAND

CH/SE/SU	C	PAGE	DATE	CH/SE/SU	C	PAGE	DATE
29-21-00		3A	Mar 29/96	29-21-00		126	Nov 30/80
29-21-00		4A	Mar 29/96	29-21-00		127	Nov 30/80
29-21-00		5	Nov 30/83	29-21-00		301	Feb 28/81
29-21-00		6	Nov 30/83	29-21-00		302	Feb 28/81
29-21-00		7	Nov 30/83	29-21-00		303	Feb 28/81
29-21-00		8	Nov 30/83	29-21-00		304	Feb 28/81
29-21-00		9	Nov 30/83	29-21-00		305	Feb 28/81
29-21-00		10	Nov 30/83	29-21-00		306	Nov 30/80
29-21-00		11	Nov 30/83	29-21-00		307	Feb 28/81
29-21-00		12	Nov 30/83	29-21-00		308	Feb 28/81
29-21-00		13	Nov 30/83	29-21-00		309	Nov 30/80
29-21-00		14	Nov 30/83	29-21-00		310	Nov 30/80
29-21-00		15	Nov 30/83	29-21-00		311	Nov 30/80
29-21-00		16	Nov 30/83	29-21-00		312	Nov 30/80
29-21-00		17	Nov 30/83	29-21-00		501	Jun 30/75
29-21-00		18	Mar 29/96	29-21-00		502	May 30/76
29-21-00		19	Mar 29/96	29-21-00		503	Nov 30/75
29-21-00		20	Mar 29/96	29-21-00		504	Nov 30/75
29-21-00		20A	Mar 29/96	29-21-00		505	Nov 30/75
29-21-00		20B	Mar 29/96	29-21-00		506	Nov 30/75
29-21-00		21	Nov 30/83	29-21-00		507	Nov 30/76
29-21-00		22	Nov 30/83	29-21-00		508	May 30/76
29-21-00		23	Mar 27/97	29-21-21		401	Mar 27/97
29-21-00		24	Mar 27/97	29-21-21		402	Nov 30/80
29-21-00		101	Feb 28/81	29-21-21		403	Nov 30/80
29-21-00		102	Feb 28/81	29-21-21		404	May 30/77
29-21-00		103	Feb 28/81	29-21-21		405	Nov 30/80
29-21-00		104	Nov 30/80	29-21-21		501	Feb 28/81
29-21-00		105	Nov 30/80	29-21-21		502	Feb 28/81
29-21-00		106	Nov 30/80	29-21-21		503	Mar 27/97
29-21-00		107	Nov 30/80	29-21-21		504	Nov 30/80
29-21-00		108	Nov 30/80	29-21-21		505	Nov 30/80
29-21-00		109	Nov 30/80	29-21-41		401	Nov 30/82
29-21-00		110	Nov 30/80	29-21-41		402	Nov 30/82
29-21-00		111	Nov 30/80	29-21-41		403	Aug 30/77
29-21-00		112	Nov 30/80	29-21-42		401	May 30/77
29-21-00		113	Nov 30/80	29-21-42		402	May 30/77
29-21-00		114	Nov 30/80	29-21-42		403	Nov 30/75
29-21-00		115	Nov 30/80	29-21-42		404	Jun 30/75
29-21-00		116	Nov 30/80	29-21-42		405	Jun 30/75
29-21-00		117	Nov 30/80	29-21-42		406	Jun 30/75
29-21-00		118	Nov 30/80	29-21-42		501	May 30/76
29-21-00		119	Nov 30/80	29-21-42		502	May 30/76
29-21-00		120	Nov 30/80	29-21-42		503	May 30/76
29-21-00		121	Nov 30/80	29-21-42		504	May 30/76
29-21-00		122	Nov 30/80	29-21-42		505	May 30/76
29-21-00		123	Nov 30/80	29-21-51		401	Feb 28/77
29-21-00		124	Nov 30/80	29-21-51		402	May 30/77
29-21-00		125	Nov 30/80	29-21-51		403	May 30/77

PRINTED IN ENGLAND

CH/SE/SU	C	PAGE	DATE	CH/SE/SU	C	PAGE	DATE
29-21-51		404	Feb 28/77	29-23-00		13	Feb 28/81
29-21-61		401	Nov 30/79	29-23-00		14	Feb 28/81
29-21-61		402	Mar 29/96	29-23-00		15	Feb 28/81
29-21-61		403	Sep 30/90	29-23-00		16	Feb 28/81
29-21-61		404	Sep 30/90	29-23-00		101	Feb 28/81
29-21-61		405	Aug 30/77	29-23-00		102	Feb 28/81
29-21-61		406	Nov 30/75	29-23-00		103	Nov 30/80
29-21-61		407	Aug 30/77	29-23-00		104	Nov 30/80
29-21-62		401	Nov 30/75	29-23-00		105	Nov 30/80
29-21-62		402	Nov 30/75	29-23-00		106	Nov 30/80
29-21-62		403	Nov 30/75	29-23-00		107	Nov 30/80
29-21-62		404	Nov 30/75	29-23-00		108	Mar 31/98
29-21-71		401	Mar 31/99	29-23-00		109	Mar 31/98
29-21-71		402	Mar 31/99	29-23-00		110	Mar 31/98
29-21-71		403	Mar 31/99	29-23-00		111	Mar 31/98
29-21-71		404	Nov 30/84	29-23-00		112	Mar 31/98
29-21-71		405	Mar 31/99	29-23-00		113	Mar 31/98
29-21-71		406	Nov 30/84	29-23-00		114	Mar 31/98
29-21-71		407	Nov 30/84	29-23-00		115	Mar 31/98
29-21-71		408	Nov 30/84	29-23-00		116	Mar 31/98
29-21-71		409	Nov 30/84	29-23-00		117	Mar 31/98
29-21-71		410	Nov 30/84	29-23-00		118	Mar 31/98
29-21-71		411	Nov 30/84	29-23-00		119	Mar 31/98
29-21-71		412	Mar 31/99	29-23-00		120	Mar 31/98
29-21-72	01	401	Aug 30/77	29-23-00		501	Sep 30/87
29-21-72	01	402	Aug 30/77	29-23-00		502	Nov 30/80
29-21-72	01	403	May 30/77	29-23-00		503	Nov 30/80
29-21-72	01	404	Aug 30/77	29-23-00		504	Nov 30/80
29-21-72	01	405	Aug 30/77	29-23-11		401	May 30/76
29-21-73		401	Nov 30/76	29-23-11		402	May 30/77
29-21-73		402	Nov 30/76	29-23-11		403	May 30/77
29-21-73		403	May 30/78	29-23-11		404	May 30/77
29-21-73		404	May 30/78	29-23-12		401	May 30/76
29-21-73		405	Aug 30/80	29-23-12		402	May 30/76
29-21-73		406	May 30/78	29-23-12		403	Jun 30/75
29-21-73		407	May 30/78	29-23-12		404	May 30/76
				29-23-13		401	Mar 31/98
29-23-00		1	May 30/77	29-23-13		402	Mar 31/98
29-23-00		2	May 30/77				
29-23-00		3	May 30/77	29-24-00		1	Aug 30/75
29-23-00		4	Mar 27/97	29-24-00		2	Aug 30/75
29-23-00		5	Jun 30/75	29-24-00		3	Aug 30/75
29-23-00		6	May 30/77	29-24-00		4	Aug 30/75
29-23-00		7	May 30/77	29-24-00		5	Aug 30/75
29-23-00		8	May 30/77	29-24-00		6	Aug 30/75
29-23-00		9	Mar 31/98	29-24-00		7	Aug 30/75
29-23-00		10	Feb 28/81	29-24-00		8	Aug 30/75
29-23-00		11	Mar 31/98	29-24-00		9	Aug 30/75
29-23-00		12	Mar 31/98	29-24-00		10	Aug 30/75

PRINTED IN ENGLAND

CH/SE/SU	C	PAGE	DATE	CH/SE/SU	C	PAGE	DATE
29-24-00		11	Aug 30/75	29-24-13		504	Nov 30/75
29-24-00		12	Aug 30/75	29-24-13		505	Nov 30/80
29-24-00		13	Aug 30/75	29-24-13		506	Nov 30/80
29-24-00		14	Aug 30/75	29-24-13		507	Nov 30/80
29-24-00		15	Aug 30/75	29-24-13		508	Nov 30/80
29-24-00		16	Aug 30/75	29-24-13		509	Nov 30/80
29-24-00		17	Aug 30/75	29-24-13		601	Feb 28/81
29-24-00		18	Aug 30/75	29-24-13		602	Mar 31/98
29-24-00		19	Aug 30/75	29-24-14		401	Nov 30/81
29-24-00		20	Aug 30/75	29-24-14		402	Feb 28/81
29-24-00		21	Aug 30/75	29-24-14		403	May 30/77
29-24-00		22	Aug 30/75	29-24-14		404	Feb 28/81
29-24-00		23	Aug 30/75	29-24-15		401	Feb 28/81
29-24-00		101	Feb 29/76	29-24-15		402	Feb 28/81
29-24-00		102	Feb 29/76	29-24-15		403	Nov 30/80
29-24-00		103	Feb 29/76	29-24-15		404	Feb 28/81
29-24-00		104	Feb 29/76	29-24-15		405	Feb 28/81
29-24-00		105	Feb 29/76	29-24-15		406	May 30/77
29-24-00		106	Feb 29/76	29-24-15		407	Feb 28/81
29-24-00		107	Feb 29/76	29-24-15		408	Feb 28/81
29-24-00		108	Feb 29/76	29-24-15		409	Feb 28/81
29-24-00		501	Nov 30/75	29-24-15		410	Nov 30/80
29-24-00		502	Nov 30/75	29-24-15		411	Feb 28/81
29-24-12		301	Nov 30/75	29-24-16	R	401	Mar 30/01
29-24-12		302	Jun 30/75	29-24-16	R	402	Mar 30/01
29-24-12		303	Nov 30/75	29-24-16	R	403	Mar 30/01
29-24-12		401	Feb 28/79	29-24-16	R	404	Mar 30/01
29-24-12		402	Feb 28/79	29-24-16	R	405	Mar 30/01
29-24-12		403	Nov 30/78	29-24-16	R	406	Mar 30/01
29-24-12		404	Feb 28/79	29-24-16	R	407	Mar 30/01
29-24-12		405	Feb 28/79	29-24-16	N	408	Mar 30/01
29-24-12		406	Feb 28/79	29-24-16		501	May 30/77
29-24-13		301	Feb 28/81	29-24-16		502	May 30/77
29-24-13		302	Nov 30/83	29-24-16		503	May 30/77
29-24-13		303	Aug 30/81	29-24-17		401	Nov 30/76
29-24-13		304	Sep 30/87	29-24-17		402	Nov 30/76
29-24-13		305	Feb 28/81	29-24-17		403	Nov 30/76
29-24-13		306	Nov 30/80	29-24-21		401	May 30/77
29-24-13		307	Nov 30/80	29-24-21		402	Feb 28/78
29-24-13		308	Nov 30/80	29-24-21		403	Nov30/76
29-24-13		309	Nov 30/80	29-24-21		404	May 30/77
29-24-13		401	Mar 31/00	29-24-21		405	Nov 30/79
29-24-13		402	Mar 31/00	29-24-21		406	Nov 30/77
29-24-13		403	Mar 31/00	29-24-21		407	Nov 30/77
29-24-13		404	Mar 31/00	29-24-21		408	Nov 30/77
29-24-13		405	Mar 31/00				
29-24-13		501	Feb 28/81	29-30-00		1	Nov 30/79
29-24-13		502	Feb 28/81				
29-24-13		503	Nov 30/80	29-31-00		1	Mar 29/96

PRINTED IN ENGLAND

CH/SE/SU	C	PAGE	DATE
29-31-00		2	May 30/76
29-31-00		3	Mar 29/96
29-31-00		4	Mar 29/96
29-31-00		4A	Mar 29/96
29-31-00		4B	Mar 29/96
29-31-00		5	Feb 29/76
29-31-00		501	May 30/76
29-31-00		502	May 30/76
29-32-00		1	May 30/76
29-32-00		2	Nov 30/83
29-32-00		3	Nov 30/84
29-32-00		101	Feb 28/81
29-32-00		102	Feb 28/81
29-32-00		103	Feb 28/81
29-32-00		104	Feb 28/81
29-32-00		105	Nov 30/79
29-32-00		106	Feb 29/76
29-32-00		107	Feb 29/76
29-32-00		108	Nov 30/78
29-32-00		109	Nov 30/79
29-32-00		110	Aug 30/80
29-32-00		111	Feb 28/81
29-32-00		112	Feb 29/80
29-32-00		113	Feb 29/80
29-32-00		114	May 30/82
29-32-00		115	Feb 29/80
29-32-00		116	Feb 29/80
29-32-00		117	Feb 29/80
29-32-00		118	Feb 29/80
29-32-00		119	May 30/82
29-32-00		120	Feb 29/80
29-32-00		121	Feb 29/80
29-32-00		122	Feb 29/80
29-32-00		123	Feb 28/81
29-32-00		124	Feb 29/80
29-32-00		125	Feb 28/81
29-32-00		126	Feb 29/80
29-32-00		501	Feb 28/81
29-32-00		502	Feb 28/81
29-32-00		503	Feb 28/81
29-32-00		504	Feb 28/81
29-32-00		505	Feb 28/81
29-32-00		506	Feb 28/81
29-32-00		507	Nov 30/80
29-32-00		508	Nov 30/80
29-32-00		509	Nov 30/80
29-32-00		510	Nov 30/80
29-32-00		511	Nov 30/80
29-32-00		512	Nov 30/80
29-32-00		513	Nov 30/80
29-32-00		514	Nov 30/83
29-32-00		515	Nov 30/83
29-32-00		516	Nov 30/83
29-32-00		517	Nov 30/83
29-32-00		518	Nov 30/83
29-32-00		519	Sep 30/87
29-32-00		520	Nov 30/83
29-33-00		1	Mar 29/96
29-33-00		2	Mar 29/96
29-33-00		3	Mar 29/96
29-33-00		501	Mar 29/96
29-33-00		502	Mar 29/96
29-33-00		503	Mar 29/96
29-33-00		504	Nov 30/79
29-33-00		505	Nov 30/79
29-33-00		506	Mar 29/96
29-33-00		507	Mar 29/96

PRINTED IN ENGLAND

SERVICE BULLETIN LIST

In the following service bulletin list, SB indicates an aircraft manufacturers bulletin, AEB indicates an airline engineering bulletin and OL indicates an engine manufacturers bulletin (complete identification OL.593-XX-XXX).

SB/AEB NO	REV	INC. IN REVISION	DESCRIPTION
SB 25-051		Aug 30/78	Embodied Equipment/Furnishings. Galley Supplies LH and RH - To maintain rear galley supplies in the event of remote controlled circuit breaker failure
SB 27-042		May 30/79	Embodied Flight Controls - Modify PFCU hydraulic supply selector unit logic to prevent transient pressure loss on servo controls in the event of fluid transfer
SB 29-001		Nov 30/76	Embodied Hydraulic power -Replacement of clogging indicators on hydraulic return line filters
SB 29-001	01		No effect Hydraulic power -Replacement of clogging indicators on hydraulic return line filters
SB 29-002		Nov 30/76	Embodied Hydraulic power -Modification to the supply pipe run to the green accumulator in component 20.
SB 29-002	01		No effect Hydraulic power -Modification to the supply pipe run to the green accumulator in component 20.
SB 29-002	02		No effect Hydraulic power -Modification to the supply pipe run to the green accumulator in component 20.
R SB 29-002	03		Embodied Hydraulic power -Modification to the supply pipe run to the green accumulator in component 20.
SB 29-003		Nov 30/76	Embodied Hydraulic power -Replacement of A.P.M. clogging indicators on HP filters and pump case drains.
SB 29-003	01		No effect Hydraulic power -Replacement of A.P.M. clogging indicators on HP filters and pump

Printed in England

SB/AEB NO	REV	INC. IN REVISION	DESCRIPTION
			case drains.
SB 29-003	02		No effect Hydraulic power -Replacement of A.P.M. clogging indicators by on HP filters and pump case drains.
SB 29-004			No effect Hydraulic power -Replacement of N.R.V.'s on hydraulic pump delivery double-skinned flexible pipes.
SB 29-004	01		No effect Hydraulic power -Replacement of N.R.V.'s on hydraulic pump delivery double-skinned flexible pipes.
SB 29-005			Not applicable
SB 29-006			Not applicable
SB 29-006	01		Not applicable
SB 29-007			No effect Hydraulic power. To improve clamping of hydraulic pipes and "AVICA" swivel couplings in the wing PFCU hydraulic pressure system component 20.
SB 29-007	01		No effect Hydraulic power. To improve clamping of hydraulic pipes and "AVICA" swivel couplings in the wing PFCU hydraulic pressure system component 20.
SB 29-007	02		No effect Hydraulic power. To improve clamping of hydraulic pipes and "AVICA" swivel couplings in the wing PFCU hydraulic pressure system component 20.
SB 29-008			No effect Hydraulic power. Replacement of the hydraulic pipe and associated coupling downstream of the Yellow hydraulic fire shut-off valve, RH side.
SB 29-008	01		No effect Hydraulic power. Replacement of the hydraulic pipe and associated coupling downstream of the Yellow hydraulic fire shut-off valve, RH side.
SB 29-008	02		No effect Hydraulic power. Replacement of the hydraulic pipe and associated coupling

SB/AEB NO	REV	INC. IN REVISION	DESCRIPTION
			downstream of the Yellow hydraulic fire shut-off valve, RH side.
SB 29-009			No effect Hydraulic power. Relocation of a pressure switch system pipe clamp block to prevent same from chafing against a fuel pipe.
SB 29-010			No effect Hydraulic power.Protection of the hydraulic reservoir pressurization control time relay against electro magnetic interference.
SB 29-010	01		No effect Hydraulic power.Protection of the hydraulic reservoir pressurization control time relay against electro magnetic interference.
SB 29-011			No effect Hydraulic power -Main and auxiliary systems -To introduce pipe end fittings to production standards at pump to filter pipe assemblies in RH intake
SB 29-012			No effect Hydraulic power. Green and blue systems -To introduce a hydraulic installation of in-creased stiffness at the engine mounted platform (engine bays 1 and 3).
SB 29-012	01		No effect Hydraulic power. Green and blue systems -To introduce a hydraulic installation of in-creased stiffness at the engine mounted platform (engine bays 1 and 3).
SB 29-012	02		No effect Hydraulic power. Green and blue systems -To introduce a hydraulic installation of in-creased stiffness at the engine mounted platform (engine bays 1 and 3).
SB 29-013			No effect Hydraulic power -Wirelocking of hydraulic manifold plugs
SB 29-013	01		No effect Hydraulic power -Wirelocking of hydraulic manifold plugs
SB 29-014			No effect Hydraulic power -To provide foolproof identification of hydraulic pipes at FR72 in LH wing upper surface-to-fuselage

SB/AEB NO	REV	INC. IN REVISION	DESCRIPTION
			fillet
SB 29-015			No effect Hydraulic power supply -Wirelocking of hydraulic sampling valves
SB 29-015	01		No effect Hydraulic power supply -Wirelocking of hydraulic sampling valves
SB 29-017			No effect Hydraulic power -Replace ground connector cap retaining chains
SB 29-018			No effect Hydraulic Power. To replace metal seals with elastomeric seals in the engine bay hydraulic system
SB 29-018	01		No effect Hydraulic Power. To replace metal seals with elastomeric seals in the engine bay hydraulic system
SB 29-018	02		No effect Hydraulic Power. To replace metal seals with elastomeric seals in the engine bay hydraulic system
SB 29-019			No effect Hydraulic Power. Main and Auxiliary Systems To provide improved wing clamp bushes for intake/engine bay hydraulic pipes in the LH and RH nacelles (To introduce PTFE lined bushes in place of rubber bushes)
SB 29-020			No effect Hydraulic Power -Hydraulic Tank Air Pressurizing System -To re-route hydraulic tank air pressurization pipes on Engines 2 and 4 to provide clearance for engine change anti-roll ground equipment
SB 29-021			No effect Hydraulic power -Improve operation of hydraulic fuses (safety valves)
SB 29-021	01		No effect Hydraulic Power - Improve operation of hydraulic fuses (Safety Valves) (MESSIER HISPANO SB 072-32-028)
SB 29-021	02		No effect Hydraulic Power - Improve operation of hydraulic fuses (Safety Valves)

SB/AEB NO	REV	INC. IN REVISION	DESCRIPTION
SB 29-022			No effect Hydraulic power -Blue and Yellow system Pump Low Pressure Switch Pipe Lines - Replacement of elbows in dry bays by strengthened elbows
SB 29-022	01		No effect Hydraulic power -Blue and Yellow system Pump Low Pressure Switch Pipe Lines - Replacement of elbows in dry bays by strengthened elbows
SB 29-023			No effect Hydraulic Power -Green System -To provide additional support for pipes on the rear face of frame 88
SB 29-023	01		No effect Hydraulic Power. Green System - To provide additional support for pipes on the rear face of frame 88
SB 29-024		Aug 30/77	Embodied Hydraulic Power -Ram Air Turbine -Introduction of blade stowage guide stops and redesigned latch plates
SB 29-025			Embodied Structure -Ram air turbine -Modify stowage bay door unlocking roller installation
SB 29-026			No effect Structure -Modify recess in ram air turbine stowage bay inboard door
SB 29-027			No effect Hydraulic Power - Main Hydraulic System Engine Driven Pump Delivery Filters - Install new head with check valves moved upstream
SB 29-027	01		No effect Hydraulic Power - Main Hydraulic System Engine Driven Pump Delivery Filters - Install new head with check valves moved upstream
SB 29-028			No effect Hydraulic power -Replace ram-air turbine generator pump
SB 29-029			No effect Hydraulic power -To introduce improved brazed end fittings to the hydraulic pipes

Printed in England

SB/AEB NO	REV	INC. IN REVISION	DESCRIPTION
			supplying the filters in the intake side-walls
SB 29-029	01		No effect Hydraulic power. To introduce improved brazed end fittings to the hydraulic pipes supplying the filters in the intake side-walls
SB 29-030			No effect Hydraulic power -Hydraulic pipe bonding in wing outer section
SB 29-030	01		No effect Hydraulic Power - Hydraulic pipe bonding in wing outer section
SB 29-031			No effect Hydraulic power -Improve reliability of ground pressurizing system electro-hydraulic selector valves
SB 29-032		Feb 28/78	Embodied Hydraulic power. Engine driven hydraulic pumps -Relocate depressurizing solenoid electrical receptacles
SB 29-032	01		No effect Hydraulic power. Engine driven hydraulic pumps -Relocate depressurizing solenoid electrical receptacles
SB 29-032	02		No effect Hydraulic Power. Engine Driven hydraulic Pumps - Relocate depressurizing solenoid electrical receptacles.
SB 29-032	03		No effect Hydraulic Power. Engine Driven hydraulic Pumps - Relocate depressurizing solenoid electrical receptacles.
SB 29-032	04		No effect
R SB 29-032	05	May 30/82	Embodied
SB 29-033			No effect Hydraulic power. Hydraulic pump delivery filters -Reinforce check valves
SB 29-034		Feb 28/79	Embodied Hydraulic Power. Landing Gear Emergency Extension - Reduce rating of yellow hydraulic system priority valve

SB/AEB NO	REV	INC. IN REVISION	DESCRIPTION
SB 29-035			No effect Hydraulic power. Main hydraulic system engine driven pumps - Replace cylinder barrels
SB 29-036			No effect Hydraulic power. Main hydraulic system engine driven pumps - Introduce bronze sleeve in yoke actuator piston cylinder
SB 29-037		Nov 30/79	Embodied Hydraulic Power - Green System : Delete fuses on Engine driven pump pressure switch line
SB 29-038		Feb 28/79	Embodied Hydraulic Power. Main Hydraulic System Engine Driven Pumps - To introduce wire-locking to nuts of shrouded flexible pipes
SB 29-039			No effect Hydraulic Power. Hydraulic Tanks and Fuel Accumulators - Pressurising system - Replace nitrile rubber 'O' ring seals by silicone rubber 'O' ring seals.
SB 29-039	01		No effect Hydraulic Power. Hydraulic Tanks and Fuel Accumulators - Pressurising system - Replace nitrile rubber 'O' ring seals by silicone rubber 'O' ring seals.
SB 29-040		Aug 30/79	Embodied Hydraulic Power - Yellow system tank - Increase normal fill level and first warning level
SB 29-040	01		No effect Hydraulic Power - Yellow system tank - Increase normal fill level and first warning level
SB 29-040	02		No effect Hydraulic Power - Yellow system tank - Increase normal fill level and first warning level
R SB 29-041		May 30/82	Embodied Hydraulic Power. Main - To introduce pressur fluctuation dampers in the green and blue hy draulic systems
SB 29-042		Aug 30/79	Embodied Hydraulic Power. Ground Hydraulic Checkout

SB/AEB NO	REV	INC. IN REVISION	DESCRIPTION
			Pump System - To introduce a new type of Remote Control Circuit Breaker
SB 29-042	01		No effect Hydraulic Power. Ground Hydraulic Checkout Pump System - To introduce a new type of Remote Control Circuit Breaker
SB 29-043			No effect Hydraulic Power - Ram Air Turbine - Replace blade pitch gerotor pump
SB 29-044			No effect Hydraulic Power - Inspection of engine-driven hydraulic pump low pressure switch supply lines
SB 29-044	01		No effect Hydraulic Power - Inspection of engine-driven hydraulic pump low pressure switch supply lines
SB 29-045		May 30/80	Embodied Hydraulic Power - To remove shrouding from engine bay hydraulic flexible hoses
SB 29-045	01		No effect Hydraulic Power - Main and auxiliary - Introduction of non shrouded hydraulic flexible pipes in engine bays
SB 29-045	02	Feb 28/81	Embodied Hydraulic Power - Main and auxiliary - Introduction of non shrouded hydraulic flexible pipes in engine bays
SB 29-045	03		No effect Hydraulic Power - Main and auxiliary - Introduction of non shrouded hydraulic flexible pipes in engine bays
SB 29-046			No effect Hydraulic Power - Replace clamp blocks securing supply line of engine 4 blue hydraulic pump pressure switch
SB 29-046	01		No effect Hydraulic Power - Replace clamp blocks securing supply line of engine 4 blue hydraulic pump pressure switch
SB 29-046	02		No effect Hydraulic Power - Replace clamp blocks securing supply line of engine 4 blue hydraulic pump pressure switch

Printed in England

	SB/AEB NO	REV	INC. IN REVISION	DESCRIPTION
	SB 29-047			No effect Hydraulic Power. General - To introduce self-sealing couplings of improved reliability in engine bays
	SB 29-048			No effect Hydraulic Power - Install modified engine driven pumps on main hydraulic systems
	SB 29-049			Not applicable
R	SB 29-050		Nov 30/81	Embodied Hydraulic Power - Yellow tank - Increase margin of hydraulic fluid before activation of the first level
R	SB 29-051		Nov 30/81	Embodied Hydraulic Power - Check integrity of yellow hydraulic return system
	SB 29-054		May 30/80	Embodied
	SB 29-900			Applicable Hydraulic Power - Life limits
	SB 29-901			Applicable Hydraulic Power - Life limits
	SB 29-902			No effect Hydraulic Power - Life limits
	SB 29-902	01		No effect Hydraulic power - Life limits
	SB 29A016			No effect Hydraulic power -Inspection of connectors of pipes installed in No.4 intake
	SB 32=001		Feb 29/76	Embodied Landing gear -Modification to ground safety system for the nose landing gear telescopic strut.
	SB 32-057		Aug 30/79	Embodied Landing Gear. Normal Braking - Provide automatic changeover from Green to Yellow Hydraulic system pressure in the event of Green system failure
	SB 71-010		May 30/78	Embodied Spill door actuation -To improve spill door jack reliability

PRINTED IN ENGLAND

CHAPTER 29

HYDRAULIC POWER

TABLE OF CONTENTS

SUBJECT	CH/SE/SU	C	PAGE	EFFECTIV
GENERAL	29-00-00			
Description and Operation			1	ALL
General			1	ALL
Main Power			1	ALL
Auxiliary Power			1	ALL
Fluid			2	ALL
Pressure			2	ALL
Hydraulic Lines			2	ALL
Ground Connections and Sampling Valves			3	ALL
Hydraulic Tank Pressurization			3	ALL
Component Location on the Aircraft			3	ALL
Controls and Indicating			3	ALL
Flight Compartment Preparation Check			11	ALL
System Management			12	ALL
Trouble Shooting			101	ALL
Isolation of Faulty Shuttle Valves			101	ALL
Servicing			301	ALL
Precautions to be Observed When Handling CHEVERON M2.V Hydraulic Fluid			301	ALL
Filter Elements - Hydraulic Tank Return Filter Asemblies			301	ALL
Filter Elements - System			307	ALL
Accumulator Charging			312	ALL
Draining of Tank Depressurization Valve Sight Glasses			315	ALL
Draining of Tank De-Aerator Safety Valve			316	ALL
Isolate Hydraulic Tank De-Aerator Safety Valve			317	ALL
Procedure Following Contamination of Hydraulic System			320	ALL
Hydraulic Fluid Reclaiming			322	ALL
Removal/Installation			401	ALL
Hydraulic Components Removal/ Installation Procedure			401	ALL
Minor Components, Removal/Installation			402	ALL
Caption Light Modules			403	ALL
Indicators			407	ALL

	SUBJECT	CH/SE/SU	C	PAGE	EFFECTIV
	Magnetic Indicators			410	ALL
	Switch			412B	ALL
	Electric Pump Control Panel			417	ALL
	Push-Button - AIR COMP (Tank Air Compressor Control)			419	ALL
	Relays			421	ALL
	Temperature Indicator			429	ALL
	Temperature Selector			431	ALL
	Pressure Transmitters			432	ALL
	Hydraulic Hose - Double Wall			435	ALL
	Hydraulic Pipes Above Air Intakes			438	ALL
	Adjustment/Test			501	ALL
	General			501	ALL
	Inspection/Check			601	ALL
	General			601	ALL
	Permissible External Hydraulic Leakage			601	ALL
	Hydraulic Tanks			602	ALL
	Valve - Tank De-Aerator Safety			604	ALL
	Filter Assembly - Tank Return			605	ALL
	Filters - Pump Case Drain			606	ALL
	Filters - Delivery			607	ALL
	Accumulators			609	ALL
	Double-Wall Hoses - Engine-Driven			610	ALL
	Pump			610	ALL
	Pumps - Engine-Driven			611	ALL
	Fluid Contamination and Sampling on Aircraft			612	ALL
	Measurement of Internal Leakage			617	ALL
	Delivery Lines of Engine-Driven Hydraulic Pump Low Pressure Switches			668	ALL
B B	Check Integrity of Yellow Hydraulic System			670	ALL
B B	External Hydraulic Leakage Checks			676	ALL
	Approved Repairs			801	ALL
	General			801	ALL
	Hoses in Engine Bays			801	ALL
	Permissible Damage on AM350 and Z3CN18 Pipes			805	ALL
	Hydraulic Rigid Pipe Replacement Using Alternative Material			807	ALL
	Emergency Hydraulic Repair Kit			808	ALL

PRINTED IN ENGLAND

SUBJECT	CH/SE/SU	C	PAGE	EFFECTIV
MAIN	29-10-00			
Description and Operation			1	ALL
General			1	ALL
GREEN SYSTEM	29-11-00			
Description and Operation			1	ALL
General			1	ALL
Description			1	ALL
Tank Assembly			3	ALL
Heat Exchangers			8	ALL
Pumps - Engine-Driven			10	ALL
Filter Assy - Tank Return			12	ALL
Valve - Pressure Relief and Manual Unloading			14	ALL
Valve - Tank De-Aerator Safety			15	ALL
Operation			16	ALL
Electrical Power Supply			21	ALL
Trouble Shooting			101	ALL
General			101	ALL
Prepare			102	ALL
Trouble Shooting (Engines Shut Down)			106	ALL
Trouble Shooting (Engines Operating)			109	ALL
Servicing			301	ALL
General			301	ALL
Procedure for Bleeding Hydraulic Pump Suction Lines			301	ALL
Green System Pressurization Using Hydraulic Ground Power Unit			304	ALL
Green System Pressurization Using Ground Pressurizing System (Electric Pump)			308	ALL
Green System Depressurization			310	ALL
Adjustment/Test			501	ALL
General			501	ALL
Operational Test			501	ALL
HYDRAULIC FLUID/FUEL SINGLE HEAT EXCHANGER	29-11-41			
Removal/Installation			401	ALL
General			401	ALL
Hydraulic Fluid/Fuel Single			401	ALL
Heat Exchanger			401	ALL
HYDRAULIC SHUT-OFF VALVE	29-11-42			
Removal/Installaiton			401	ALL
General			401	ALL
Hydraulic Shut-off Valves			401	ALL

PRINTED IN ENGLAND

SUBJECT	CH/SE/SU	C	PAGE	EFFECTIV
Adjustment/Test			501	ALL
General			501	ALL
Operational Test			501	ALL
Functional Test			503	ALL
HYDRAULIC POWER ACCUMULATOR	29-11-44			
Removal/Installation			401	ALL
General			401	ALL
Accumulator			401	ALL
HYDRAULIC FLUID/FUEL DOUBLE HEAT EXCHANGER	29-11-45			
Removal/Installation			401	ALL
General			401	ALL
Hydraulic Fluid/Fuel Double Heat Exchanger			401	ALL
SAMPLING VALVE	29-11-52			
Removal/Installation			401	ALL
General			401	ALL
Sampling Valve			401	ALL
HYDRAULIC TANK ASSEMBLY	29-11-61			
Removal/Installation			401	ALL
General			401	ALL
Tank Assembly - Hydraulic			401	ALL
Electric Sub Assembly - Quantity Transmitter/Direct Reading Indicator			405	ALL
LP FILTER (RESERVOIR RETURN)	29-11-62			
Removal/Installation			401	ALL
General			401	ALL
LP Filter			401	ALL
ENGINE DRIVEN HYDRAULIC PUMP	29-11-71			
Removal/Installation			401	ALL
General			401	ALL
Pumps - Engine-Driven Hydraulic			401	ALL
Shaft - Drive			409	ALL
Off-Load Solenoid Replacement			412	ALL
LOW PRESSURE SWITCH	29-11-72	01		
Removal/Installation			401	ALL
General			401	ALL
ENGINE-DRIVEN PUMP DELIVERY FILTERS	29-11-73			
Removal/Installation			401	ALL
General			401	ALL
Engine-Driven Pump Delivery Filter			401	ALL

PRINTED IN ENGLAND

SUBJECT	CH/SE/SU	C	PAGE	EFFECTIV
BLUE SYSTEM	29-12-00			
Description and Operation			1	ALL
General			1	ALL
Description			1	ALL
Tank Assembly			3	ALL
Heat Exchangers			8	ALL
Pumps - Engine-Driven			10	ALL
Filter Assy - Tank Return			12	ALL
Valve - Pressure Relief and Manual Unloading			15	ALL
Valve - Tank De-Aerator Safety			16	ALL
Operation			17	ALL
Electrical Power Supply			23	ALL
Trouble Shooting			101	ALL
General			101	ALL
Prepare			102	ALL
Trouble Shooting (Engines Shut Down)			106	ALL
Trouble Shooting (Engines Operating)			109	ALL
Servicing			301	ALL
General			301	ALL
Procedure for Bleeding Hydraulic Pump Suction Lines			301	ALL
Blue System Pressurization Using Hydraulic Ground Power Unit			304	ALL
Blue System Pressurization Using Ground Pressurizing System (Electric Pump)			308	ALL
Blue System Depressurization			311	ALL
Adjustment/Test			501	ALL
General			501	ALL
Operational Test			501	ALL
HYDRAULIC FLUID/FUEL SINGLE HEAT EXCHANGER	29-12-41			
Removal/Installation			401	ALL
General			401	ALL
Hydraulic Fluid/Fuel Single Heat Exchanger			401	ALL
HYDRAULIC SHUT-OFF VALVE	29-12-42			
Removal/Installation			401	ALL
General			401	ALL
Shut-Off Valves			401	ALL
Adjustment/Test			501	ALL
General			501	ALL
Operational Test			501	ALL
Functional Test			503	ALL

PRINTED IN ENGLAND

SUBJECT	CH/SE/SU	C	PAGE	EFFECTIV
HYDRAULIC POWER ACCUMULATOR	29-12-44			
Removal/Installation			401	ALL
General			401	ALL
Accumulator			401	ALL
HYDRAULIC FLUID/FUEL DOUBLE HEAT EXCHANGER	29-12-45			
Removal/Installation			401	ALL
General			401	ALL
Hydraulic Fluid/Fuel Double Heat Exchanger			401	ALL
SAMPLING VALVE	29-12-52			
Removal/Installation			401	ALL
General			401	ALL
Sampling Valve			401	ALL
HYDRAULIC TANK ASSEMBLY	29-12-61			
Removal/Installation			401	ALL
General			401	ALL
Tank Assembly - Hydraulic			401	ALL
Electric Sub-Assembly - Quantity Transmitter/Direct Reading Indicator			405	ALL
LP FILTER (RESERVOIR RETURN)	29-12-62			
Removal/Installation			401	ALL
General			401	ALL
LP Filter			401	ALL
ENGINE-DRIVEN HYDRAULIC PUMP	29-12-71			
Removal/Installation			401	ALL
General			401	ALL
Pumps - Engine-Driven Hydraulic			401	ALL
Shaft - Drive			409	ALL
Off-Load Solenoid Replacement			412	ALL
LOW PRESSURE SWITCH	29-12-72	01		
Removal/Installation			401	ALL
General			401	ALL
ENGINE-DRIVEN PUMP DELIVERY FILTERS	29-12-73			
Removal/Installation			401	ALL
General			401	ALL
Engine Driven Pump Delivery Filter			401	ALL
HYDRAULIC TANK PRESSURIZING SYSTEM	29-13-00			
Description and Operation			1	ALL
General			1	ALL
Description			1	ALL
Valves - Thermal Shut-Off			1	ALL
Valve - Pressure Reducing			3	ALL
Restrictor			3	ALL
Compressor - Air			3	ALL
Operation			6	ALL
Indication			7	ALL

PRINTED IN ENGLAND

SUBJECT	CH/SE/SU	C	PAGE	EFFECTIV
Trouble Shooting			101	ALL
General			101	ALL
Prepare			101	ALL
Trouble Shooting : Pressurizing Circuit			103	ALL
Trouble Shooting : Air Compressor			104	ALL
Trouble Shooting : Thermal Shut-Off Valves			105	ALL
Servicing			301	ALL
General			301	ALL
Tank Pressurization Using an External Air Source			301	ALL
Tank Pressurization Using On-Board Air Compressor			303	ALL
Tank Depressurization			304	ALL
Adjustment/Test			501	ALL
General			501	ALL
Functional Test			501	ALL
THERMAL SHUT-OFF VALVES	29-13-11			
Removal/Installation			401	ALL
General			401	ALL
Adjustment/Test			501	ALL
General			501	ALL
Functional Test			501	ALL
Inspection/Check			601	ALL
General			601	ALL
Reservoir Pressurization Thermal Shut-Off Valve			601	ALL
AIR ELECTRO-COMPRESSOR	29-13-24			
Removal/Installation			401	ALL
General			401	ALL
Compressor			401	ALL

PRINTED IN ENGLAND

SUBJECT	CH/SE/SU	C	PAGE	EFFECTIV
AUXILIARY	29-20-00			
Description and Operation			1	ALL
General			1	ALL
YELLOW SYSTEM	29-21-00			
Description and Operation			1	ALL
General			1	ALL
Description			1	ALL
Tank Assembly			5	ALL
Heat Exchangers			10	ALL
Pumps - Engine Driven			12	ALL
Filter Assy - Tank Return			14	ALL
Valve - Pressure Relief and Manual Unloading			14	ALL
Valve - Tank De-Aerator Safety			17	ALL
Operation			18	ALL
Electrical Power Supply			24	ALL
Trouble Shooting			101	ALL
General			101	ALL
Prepare			102	ALL
Trouble Shooting (Engines Shut Down)			106	ALL
Trouble Shooting (Engines Operating)			111	ALL
Servicing			301	ALL
General			301	ALL
Procedure for Bleeding Hydraulic Pump Suction Lines			301	ALL
Yellow System Pressurization Using Hydraulic Ground Power Unit			304	ALL
Yellow System Pressurization Using Ground pressurizing System (Electric Pumps)			308	ALL
Yellow System Depressurization			311	ALL
Adjustment/Test			501	ALL
General			501	ALL
Functional Test			501	ALL
PRIORITY VALVE	29-21-21			
Removal/Installation			401	ALL
General			401	ALL
Priority Valve			401	ALL
Adjustment/Test			501	ALL
General			501	ALL
Tests			501	ALL
HYDRAULIC POWER ACCUMULATOR	29-21-41			
Removal/Installation			401	ALL
General			401	ALL
Accumulator			401	ALL

PRINTED IN ENGLAND

SUBJECT	CH/SE/SU	C	PAGE	EFFECTIV
HYDRAULIC SHUT-OFF VALVE	29-21-42		401	ALL
Removal/Installation			401	ALL
General			401	ALL
Shut-Off Valves			401	ALL
Adjustment/Test			501	ALL
General			501	ALL
Operational Test			501	ALL
Functional test			503	ALL
SAMPLING VLAVE	29-21-51			
Removal/Installation			401	ALL
General			401	ALL
Sampling Valve			401	ALL
HYDRAULIC TANK ASSEMBLY	29-21-61			
Removal/Installation			401	ALL
General			401	ALL
Tank Assembly - Hydraulic			401	ALL
Electric Sub-Assembly - Quantity Transmitter/Direct Reading Indicator			405	ALL
HYDRAULIC TANK RETURN FILTER ASSY	21-21-62			
Removal/Installation			401	ALL
General			401	ALL
LP Filter			401	ALL
ENGINE-DRIVEN HYDRAULIC PUMP	29-21-71			
Removal/Installation			401	ALL
General			401	ALL
Pumps - Engine-Driven Hydraulic			401	ALL
Shaft - Drive			409	ALL
Off-Load Solenoid Replacement			412	ALL
LOW PRESSURE SWITCH	29-21-72	01		
Removal/Installation			401	ALL
General			401	ALL
ENGINE DRIVEN PUMP DELIVERY FILTERS	29-21-73			
Removal/Installation			401	ALL
General			401	ALL
Engine Driven Pump Delivery Filter			401	ALL
GROUND PRESSURIZING SYSTEM	29-23-00			
Description and Operation			1	ALL
General			1	ALL
Description			1	ALL
Electric Pumps			3	ALL
Electro-Hydraulic Selector Valves			5	ALL
Filters			7	ALL
Operation			9	ALL
Control Panel			9	ALL

PRINTED IN ENGLAND

SUBJECT	CH/SE/SU	C	PAGE	EFFECTIV
Trouble Shooting			101	ALL
General			101	ALL
Prepare			102	ALL
Trouble Shooting			103	ALL
Adjustment/Test			501	ALL
General			501	ALL
Functional Test			501	ALL
ELECTRO-HYDRAULIC SELECTOR VALVES	29-23-11			
Removal/Installation			401	ALL
General			401	ALL
Electro Hydraulic Selector Valves			401	ALL
ELECTRIC PUMPS	29-23-12			
Removal/Installation			401	ALL
General			401	ALL
Electric Pumps			401	ALL
REMOTE CONTROL CIRCUIT BREAKERS	29-23-13			
Removal/Installation			401	ALL
General			401	ALL
Remote Control Circuit Breakers (M657, M658)			401	ALL
RAM AIR TURBINE	29-24-00			
Description and Operation			1	ALL
General			1	ALL
Description			1	ALL
Operation			1	ALL
Ram Air Turbine			3	ALL
Gearbox			14	ALL
Pumps			14	ALL
Valve Modules			14	ALL
Stowed Position Uplocking System			19	ALL
Ejection Jack			21	ALL
Control Panel			22	ALL
Trouble Shooting			101	ALL
General			101	ALL
Prepare			101	ALL
Trouble Shooting			103	ALL
Adjustment/Test			501	ALL
General			501	ALL
Operational Test			501	ALL
EJECTION JACK	29-24-12			
Servicing			301	ALL
General			301	ALL
Filling and Bleeding			301	ALL
Removal/Installation			401	ALL
General			401	ALL
Ejection Jack			401	ALL
Blade Stowage Guide Stop			405	ALL

PRINTED IN ENGLAND

SUBJECT	CH/SE/SU	C	PAGE	EFFECTIV
RAM AIR TURBINE	29-24-13			
Servicing			301	ALL
General			301	ALL
Ram Air Turbine (RAT) - Extension and Stowing			301	ALL
Filter Elements - Replacements			306	ALL
Removal/Installation			401	ALL
General			401	ALL
Ram Air Turbine			401	ALL
Adjustment/Test			501	ALL
General			501	ALL
Ground Test			501	ALL
Adjustment of RAT Blade Stowage Guide Stops			506	ALL
Inspection/Check			601	ALL
General			601	ALL
Ram Air Turbine			601	ALL
VALVE MODULE TYPE MV4	29-24-14			
Removal/Installation			401	ALL
General			401	ALL
Valve Module MV4			401	ALL
VALVE MODULE TYPE MV5	29-24-15			
Removal/Installation			401	ALL
General			401	ALL
Valve Module MV5			401	ALL
Ram Air Turbine Blade Stowage Guide Stops			409	ALL
UPLOCK UNIT	29-24-16			
Removal/Installation			401	ALL
General			401	ALL
Uplock Unit			401	ALL
Cartridges - Gas, Uplock Release			404	ALL
Adjustment/Test			501	ALL
General			501	ALL
Adjustment of Uplock Pin			501	ALL
SPRING ROD	29-24-17			
Removal/Installation			401	ALL
General			401	ALL
Spring Rod			401	ALL
DOORS	29-24-21			
Removal/Installation			401	ALL
General			401	ALL
Doors			401	ALL

PRINTED IN ENGLAND

SUBJECT	CH/SE/SU	C	PAGE	EFFECTIV
INDICATING AND MONITORING	29-30-00			
Description and Operation			1	ALL
General			1	ALL
PRESSURE	29-31-00			
Description and Operation			1	ALL
General			1	ALL
Adjustment/Test			501	ALL
Functional Test of Hydraulic Tank Pressurization Indicating			501	ALL
LEVEL	29-32-00			
Description and Operation			1	ALL
General			1	ALL
Direct Reading Gauge on the Tank			1	ALL
Repeater Indicator at the Flight Engineer's Station			1	ALL
Low Level Indicating at the Flight Engineer's Station			1	ALL
Trouble Shooting			101	ALL
General			101	ALL
Prepare			101	ALL
Trouble Shooting : Green and Blue Hydraulic Tank level			105	ALL
Trouble Shooting : Yellow Hydraulic Tank Level			108	ALL
Adjustment/Test			501	ALL
Functional Test (Green Hydraulic Tank Level Indicating and Control)			501	ALL
Functional Test (Blue Hydraulic Tank Level Indicating and Control)			507	ALL
Functional Test (Yellow Hydraulic Tank Level Indicating and Control)			513	ALL
TEMPERATURE	29-33-00			
Description and Operation			1	ALL
General			1	ALL
Adjustment/Test			501	ALL
Operational Test			501	ALL
System Test			503	ALL

PRINTED IN ENGLAND

GENERAL - DESCRIPTION AND OPERATION

1. General (Ref. Fig. 001)

Hydraulic power is used to operate those aircraft services requiring a power supply which is substantial and instantaneous, and at the same time meets adequate safety requirements with a minimum of weight.

Safety considerations have led to the installation of independent systems together with one or more back-up systems to ensure operation of all vital services. The same considerations have also determined the number of pumps per system.

Power is generated by main and auxiliary systems.
R ON A/C 001-006 (Ref. Fig. 002)
R ON A/C 007-007 (Ref. Fig. 002A)

2. Main Power

Main power is supplied by two hydraulic systems:

- The Green system
- The Blue system

These two systems supply the power necessary for all the aircraft hydraulic services.

3. Auxiliary Power

Auxiliary hydraulic power is provided by several systems:

- The Yellow system
- The ground pressurizing system
- The ultimate emergency ram air turbine system

A. Yellow System

The Yellow system is used to replace a defective Green or Blue system.

B. Ground Pressurizing System

This system is used, on the ground only, for maintenance and testing operations.

PRINTED IN ENGLAND

C. Ultimate Emergency System - Ram Air Turbine

The ultimate emergency system (ram air turbine) is used in the case of failure of the four engines.
The ram air turbine is an ejectable aerodynamic spinner, normally retracted, consisting of a propeller driving two hydraulic pumps. The pumps provide the necessary hydraulic power for controlling the aircraft until it lands.

4. Fluid

The hydraulic fluid used is Chevron M2V. It is contained in tanks sufficiently large to allow for fluid expansion and fluctuation.

A. Filtering

The hydraulic fluid is kept at the required degree of cleanliness by filters installed in the high pressure and low pressure lines.
Furthermore, all fluid in the tank return and filling lines passes through filters with a very high filtering capability.

B. Temperature

Hydraulic fluid temperature is kept stable by means of hydraulic fluid/fuel heat exchangers.

5. Pressure

A. Each system is pressurized to 4000 psi (275 bars) by two self-regulating pumps driven by the engine accessory gear boxes.

B. Location of Pumps on the Aircraft (Ref. Fig. 003)

The pumps are mounted on the aircraft in such a way that in the event of failure of two engines, two hydraulic pressure systems remain available.

6. Hydraulic Lines

The rigid HP hydraulic lines are mainly of titanium alloy with some steel. The LP lines are of aluminium alloy except in fire zones and special installations where steel pipes are used. On all titanium and steel pipes, brazed end fittings and removable couplings are used. On the light alloy pipes, standard AN fittings are used.

PRINTED IN ENGLAND

Thermal expansion couplings, of the "Flight Refuelling" type, are also installed to absorb any structural deformation (by bending or expansion).

7. Ground Connections and Sampling Valves

The hydraulic systems are provided with ground connections and sampling valves, which enable ground maintenance and testing of the systems.

8. Hydraulic Tank Pressurization

In order to ensure that the pumps receive a satisfactory supply of hydraulic fluid, a tank pressurization system has been installed. The tanks are normally pressurized by air bled from the engines, and on the ground they can be pressurized by an air compressor.

9. Component Location on the Aircraft (Ref. Fig. 003)

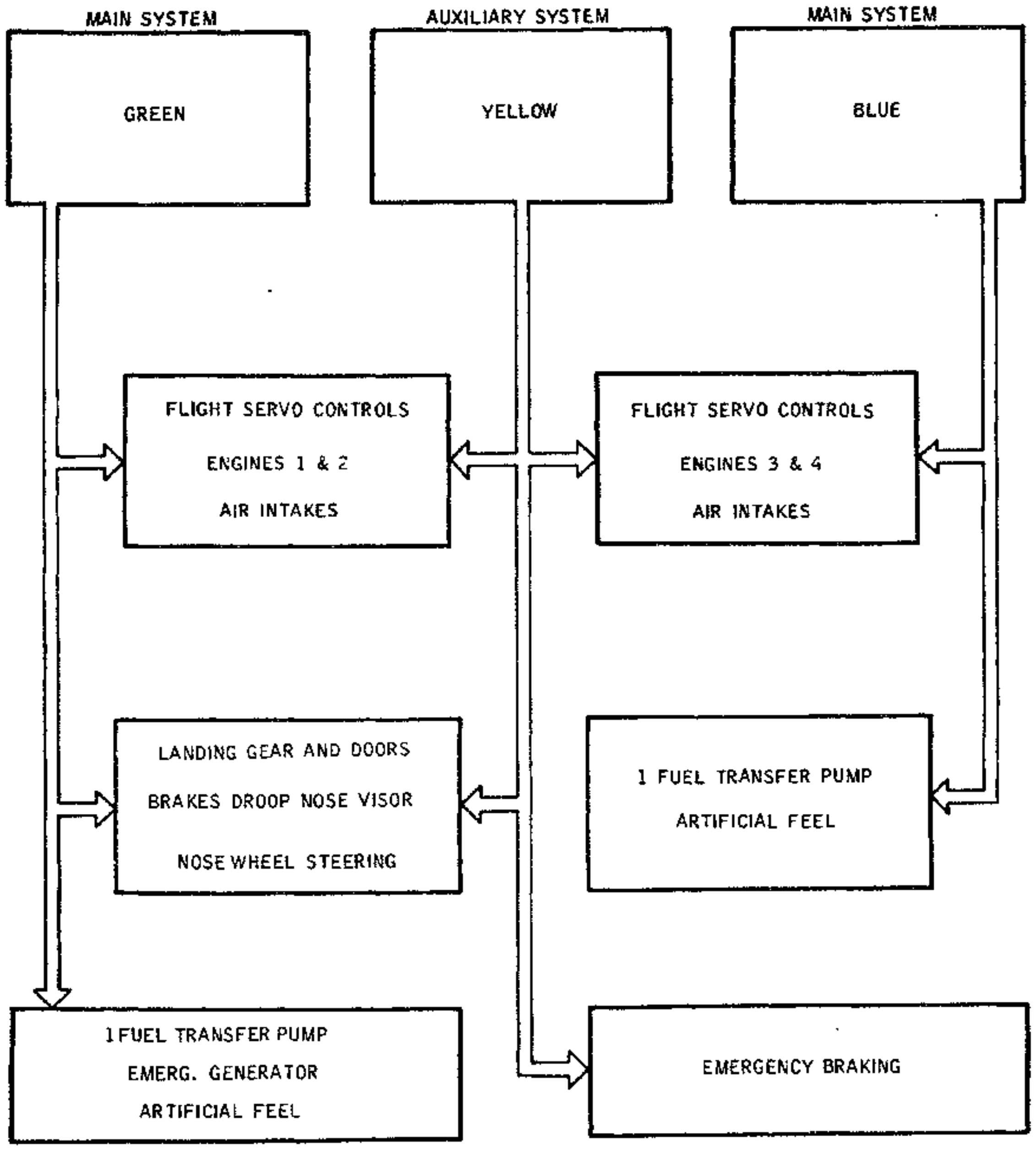
In order to facilitate maintenance, the main components are grouped in hydraulics bays situated between frames 69 and 73.

10. Controls and Indicating

All hydraulic system controls and indicators are grouped together on the 3CM's panel.

R On A/C 001-006 (Ref. Fig. 004)
R On A/C 007-007 (Ref. Fig. 004A)
(Ref. Fig. 005)
(Ref. Fig. 006)

PRINTED IN ENGLAND

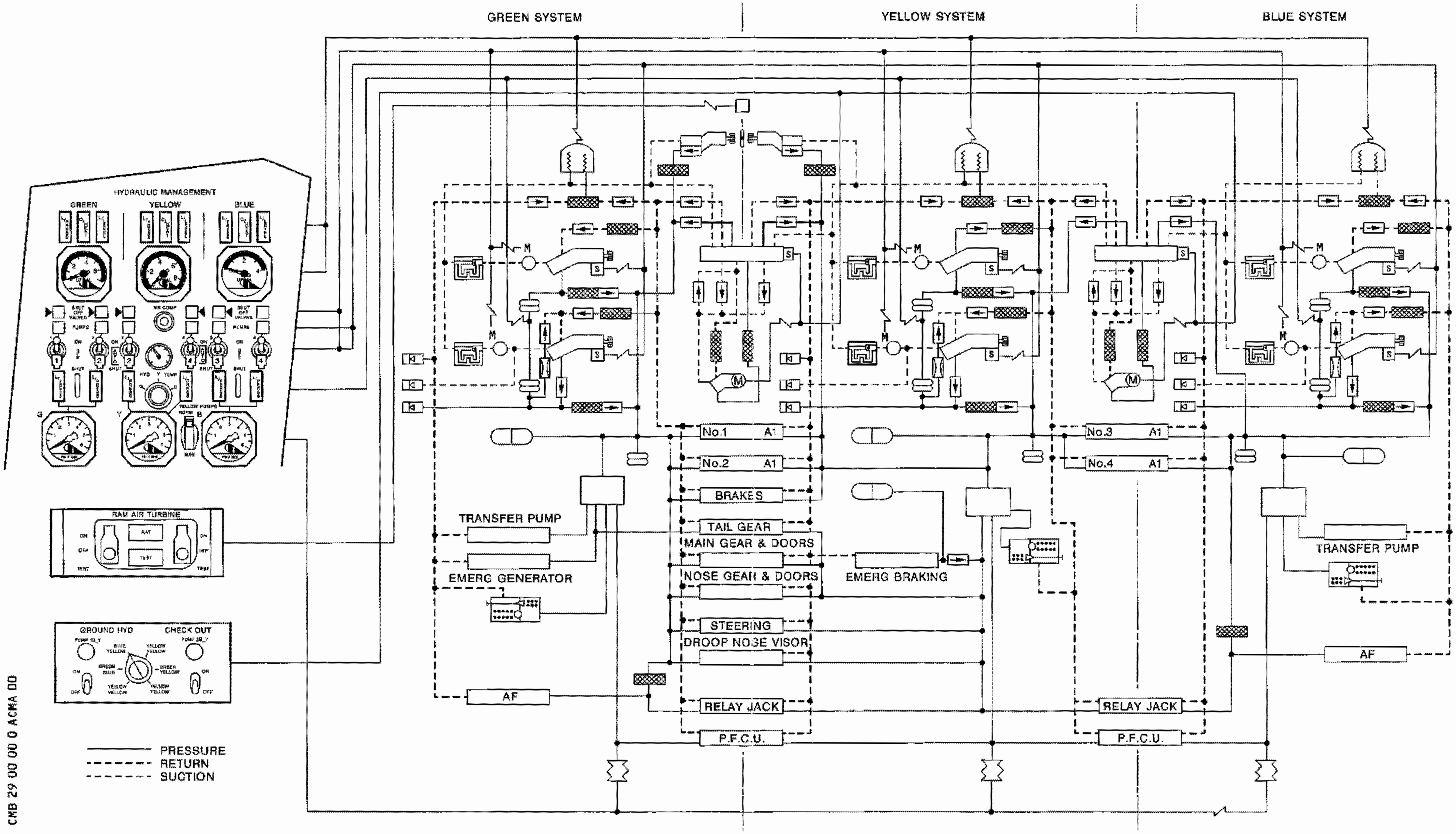


CMA 29 00 00 0 AAM0

R

Hydraulic System
Figure 001

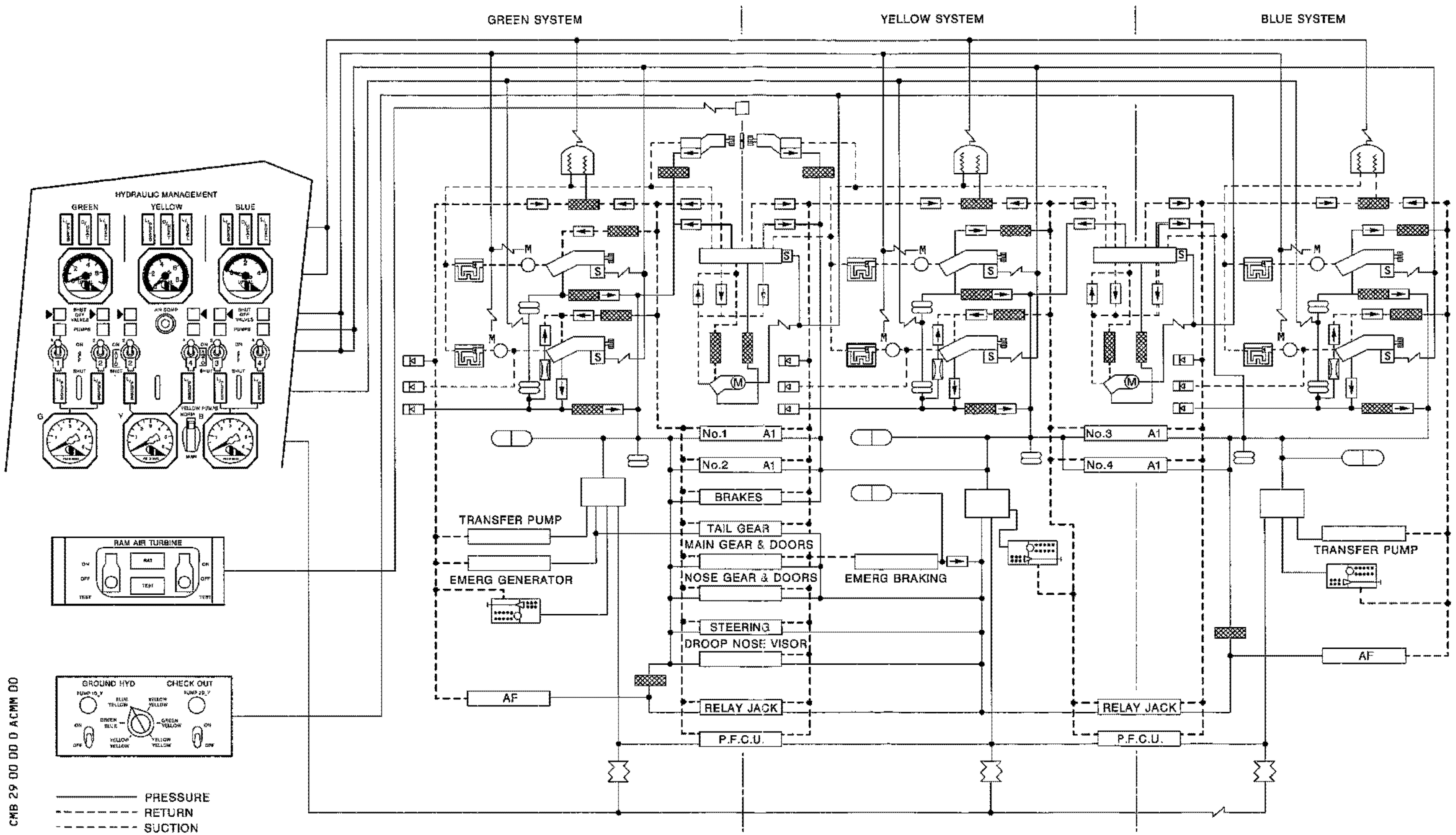
PRINTED IN ENGLAND



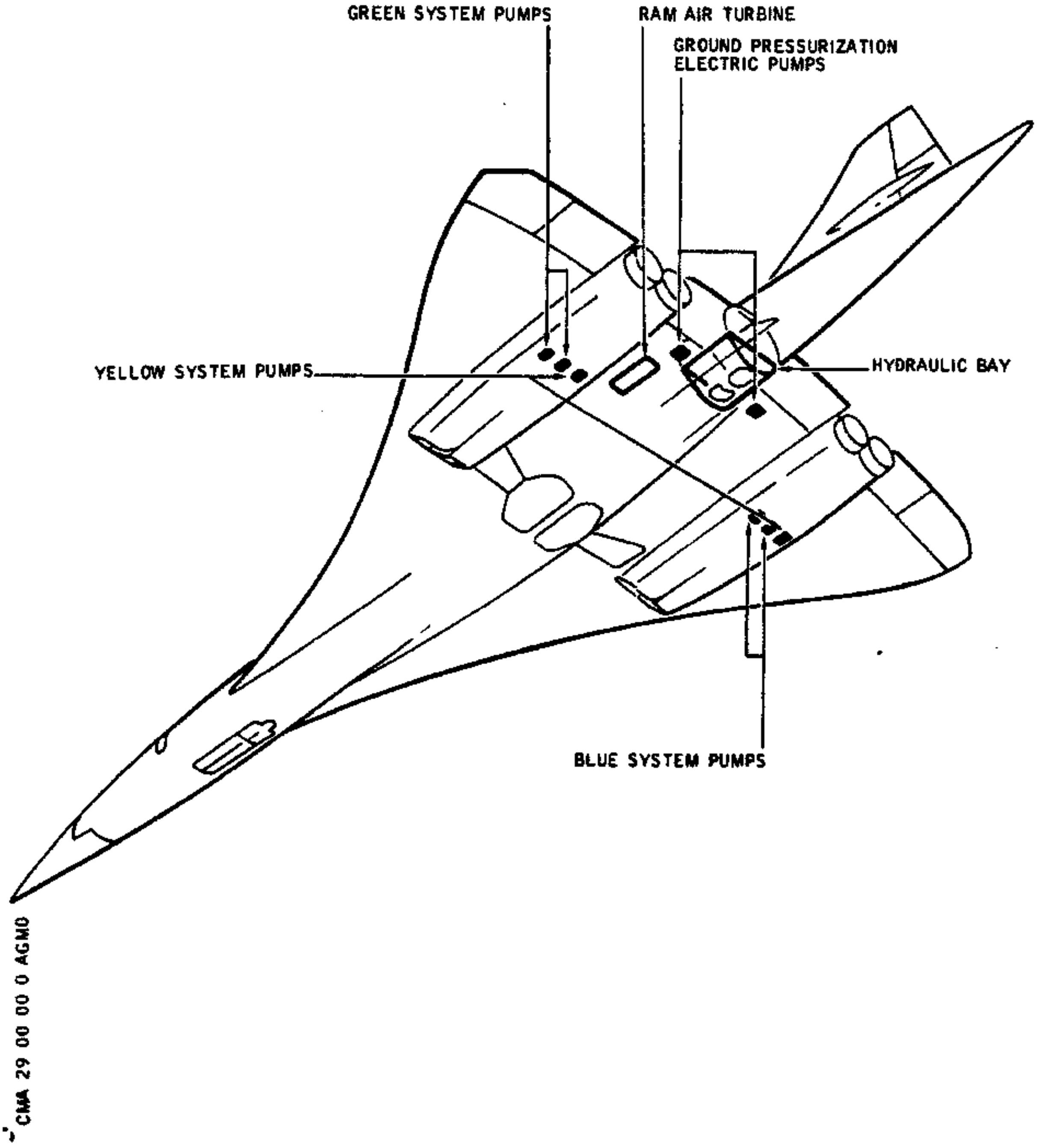
CMB 29 00 00 0 ACMA 00

Hydraulic System
Figure 002

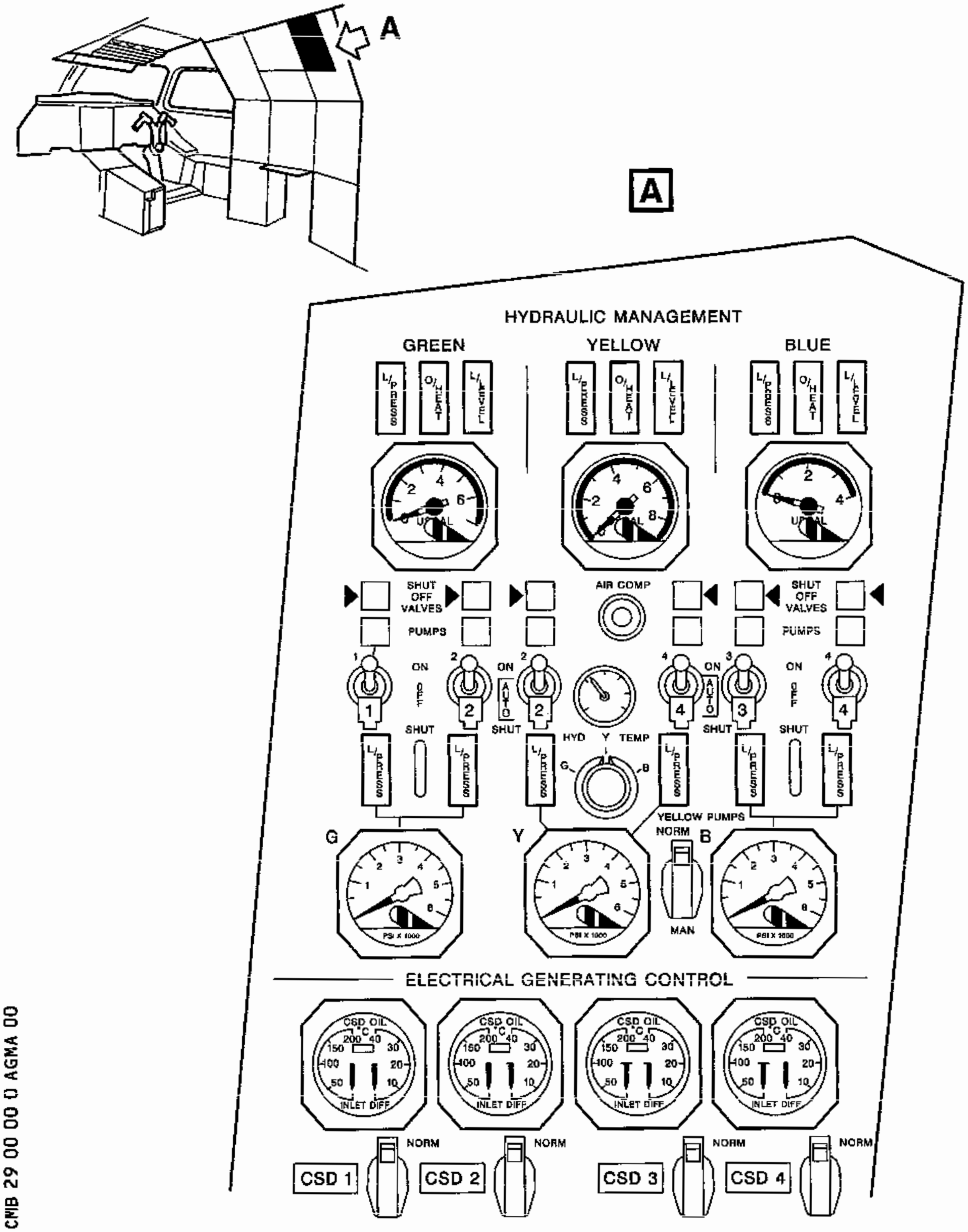
PRINTED IN ENGLAND



Hydraulic System
Figure 002A



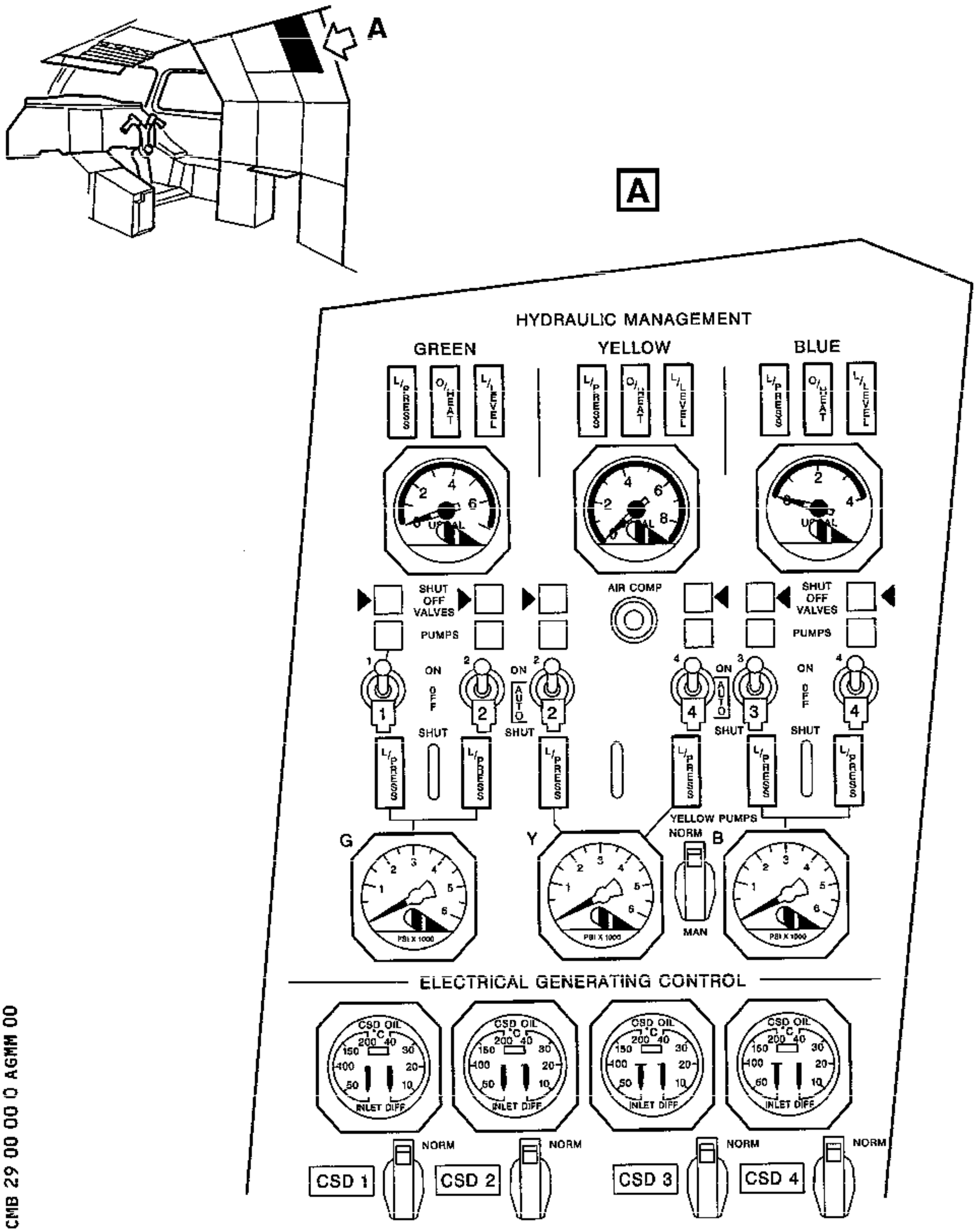
R Component Location on the Aircraft
Figure 003



Hydraulic Management Panel
Figure 004

PRINTED IN ENGLAND

CMB 29 00 00 0 AGMA 00

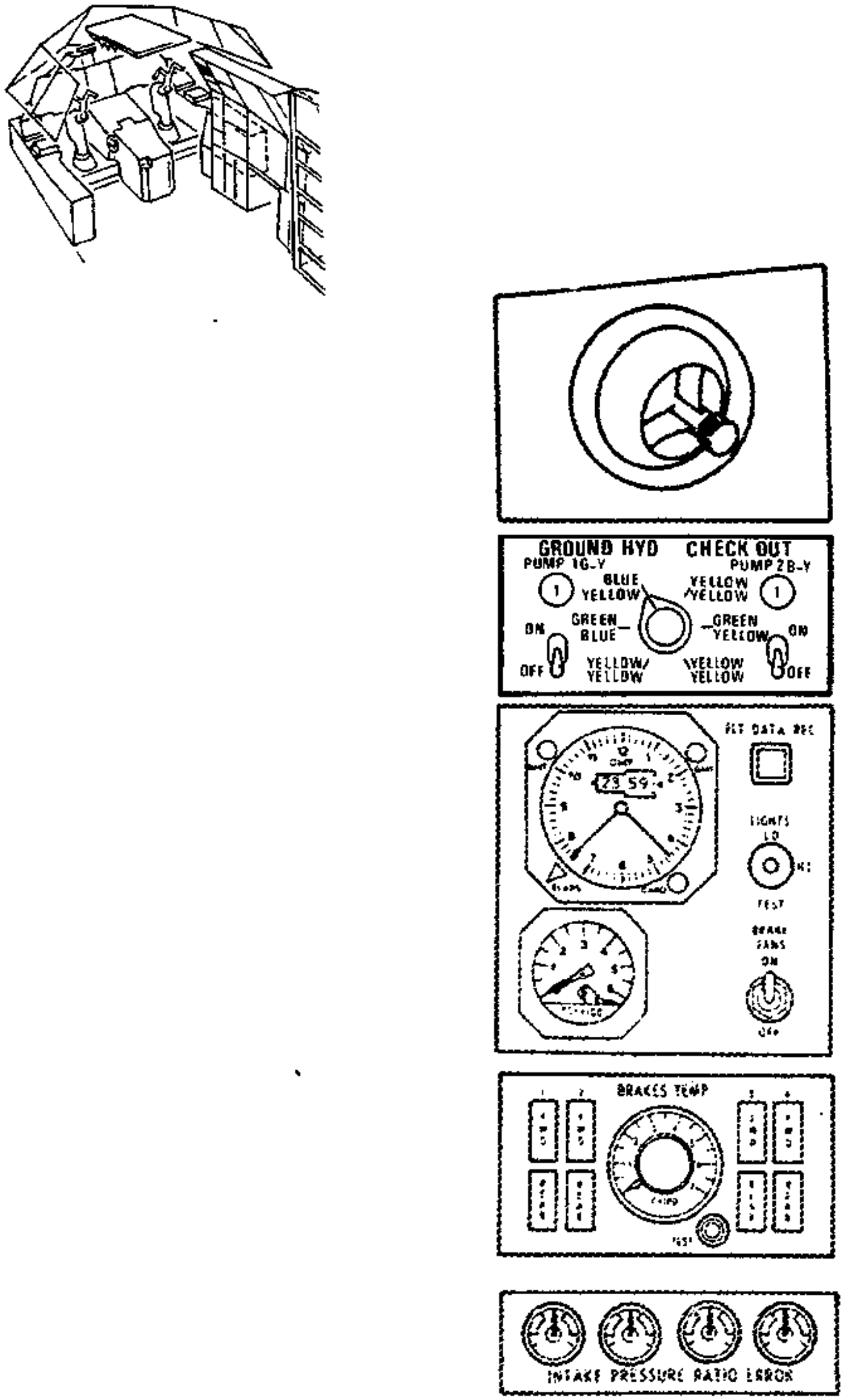


Hydraulic Management Panel
Figure 004A

PRINTED IN ENGLAND

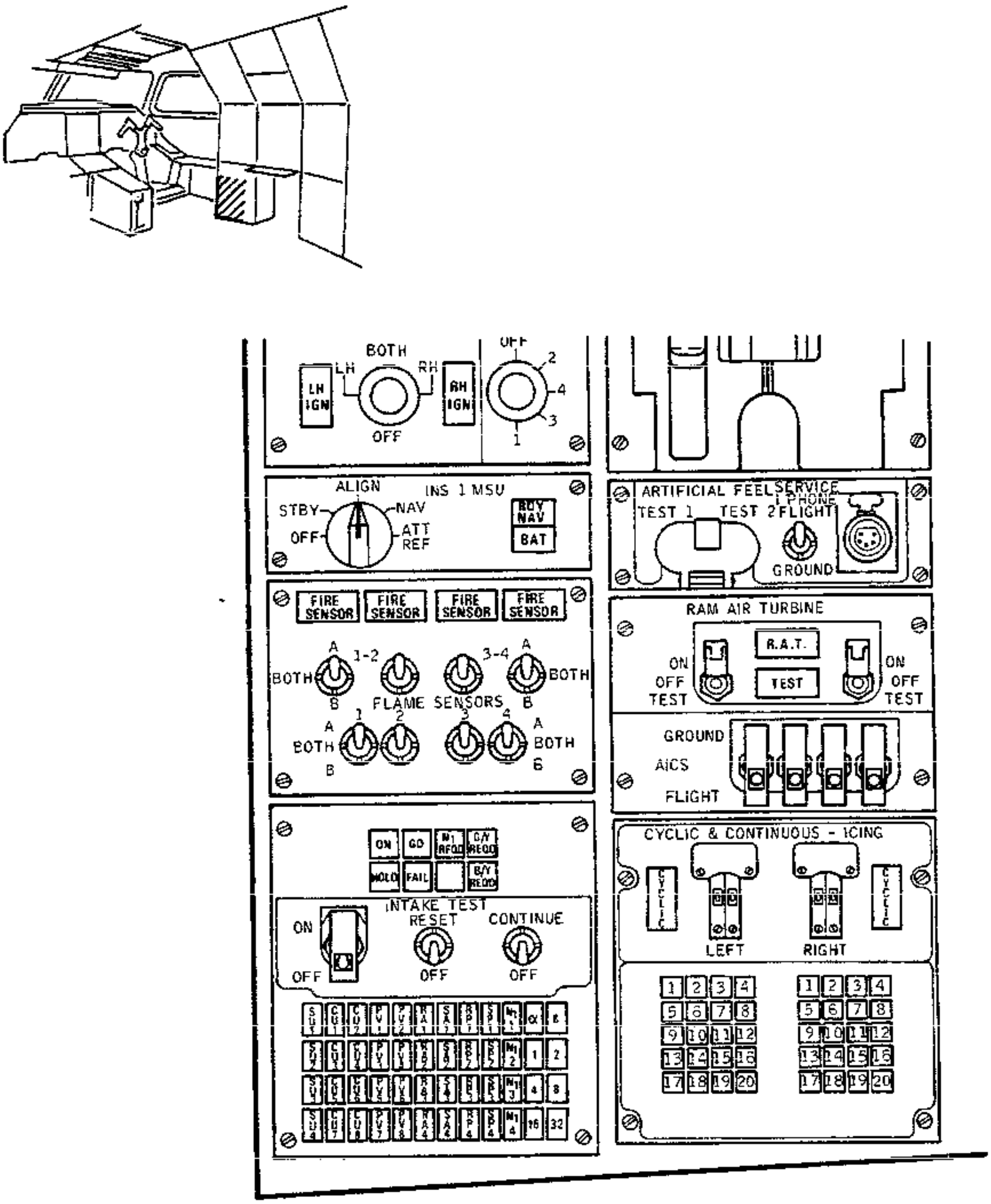
PRINTED IN ENGLAND

INTENTIONALLY BLANK



CMA 29 00 00 0 ANMO

R Ground Hydraulic Check Out Panel
Figure 005



CMA 29 00 00 0 ARMO

RAM AIR TURBINE Control Panel
Figure 006

11. Flight Compartment Preparation Check

The flight compartment preparation check lists all the operations to be performed on the controls and indicators in the flight compartment, in order to prepare the hydraulic system for operation.

Flight Compartment Preparation Check

	R.A.T. light	OFF
R	RAM AIR TURBINE switches (2)	OFF, guarded
R	RAM AIR TURBINE, left switch	TEST
	TEST light (blue)	ON
R	RAM AIR TURBINE, left switch	Release
	TEST light (blue)	OFF
R	RAM AIR TURBINE, right switch	TEST
	TEST light (blue)	ON
R	RAM AIR TURBINE, right switch	release
R	TEST light (blue)	OFF
	PUMP 1 G-Y and PUMP 2 B-Y circuit breakers	set
	YELLOW/YELLOW rotary selector	YELLOW/YELLOW
	Green system tank L/PRESS light	OFF
	Yellow system tank L/PRESS light	OFF
	Blue system tank L/PRESS light	OFF
	Green system O/HEAT light	OFF
	Yellow system O/HEAT light	OFF
	Blue system O/HEAT light	OFF
	Green system L/LEVEL light	OFF
	Yellow system L/LEVEL light	OFF
	Blue system L/LEVEL light	OFF
	GREEN, YELLOW, BLUE system tank quantity indicator pointer	green band, no failure flags
	SHUT OFF VALVES magnetic indicators (6)	OPEN
	Green system pump control switches 1 and 2	ON, guarded, wirelocked
	PUMPS magnetic indicator	ON
	Blue system pump control switches 3 and 4	ON, guarded, wirelocked
	PUMPS mangetic indicator	ON
	Yellow system pump control switches 2 and 4	AUTO, guarded wirelocked
	Yellow system PUMPS magnetic indicators	ON
	Hydraulic temperature on selected tank	NORMAL
	L/PRESS, hyd pump, lights (amber) (6)	ON
	GREEN, YELLOW, BLUE system pressure indicator pointers	0 no failure flags

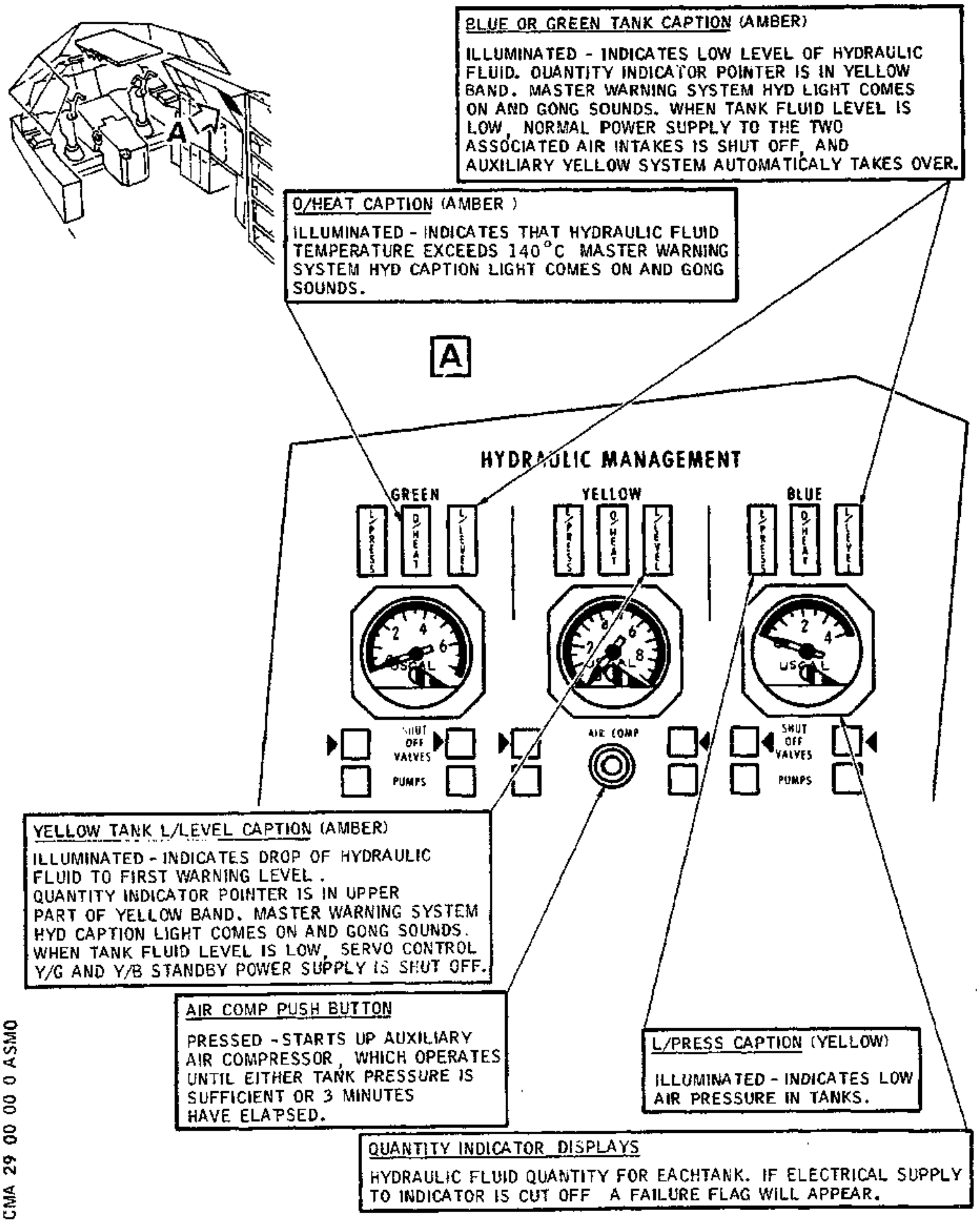
PRINTED IN ENGLAND

YELLOW PUMPS switch	NORM and guarded

12. System Management

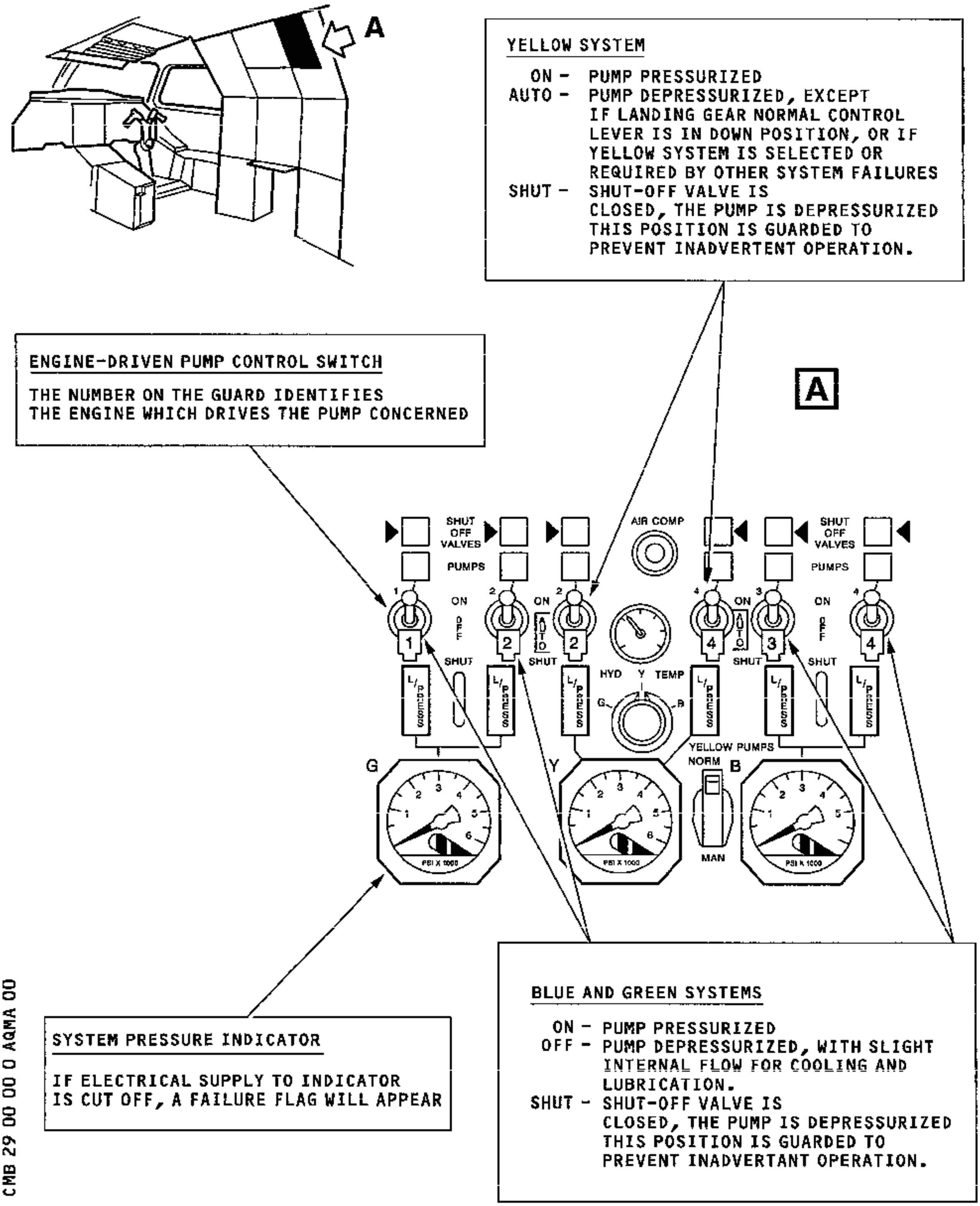
Hydraulic system management procedures enabling the system to be controlled and monitored, either to test the system and its components, or to perform servicing operations, are carried out by means of switches, and indicators which are located in the flight compartment.
(Ref. Fig. 007)
R On A/C 001-006 (Ref. Fig. 008 and 009)
R On A/C 007-007 (Ref. Fig. 008A and 009A)
(Ref. Fig. 010 and 011)

PRINTED IN ENGLAND



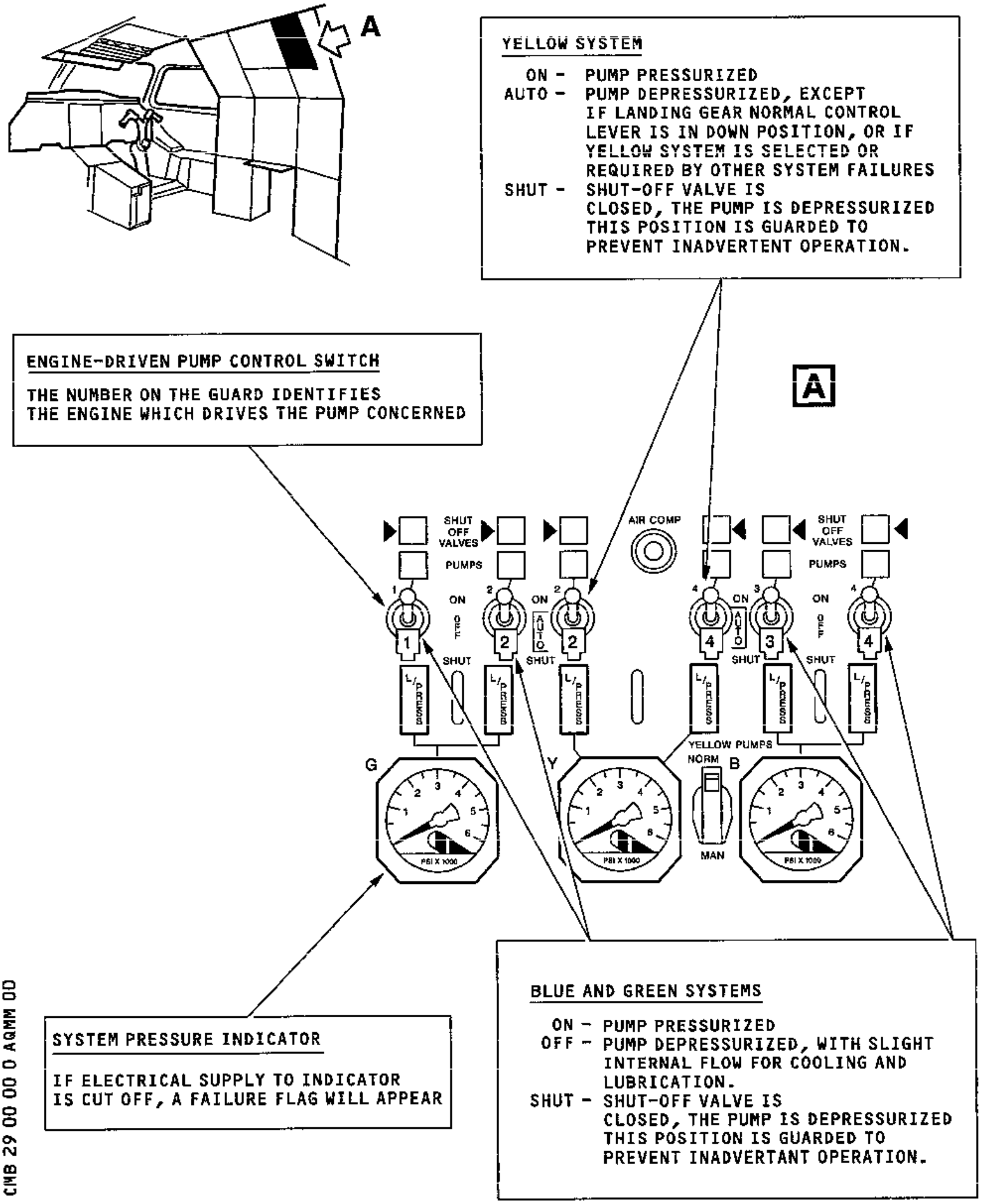
CMA 29 00 00 0 ASMO

Hydraulic Management Panel
Figure 007



Hydraulic Management Panel
Figure 008

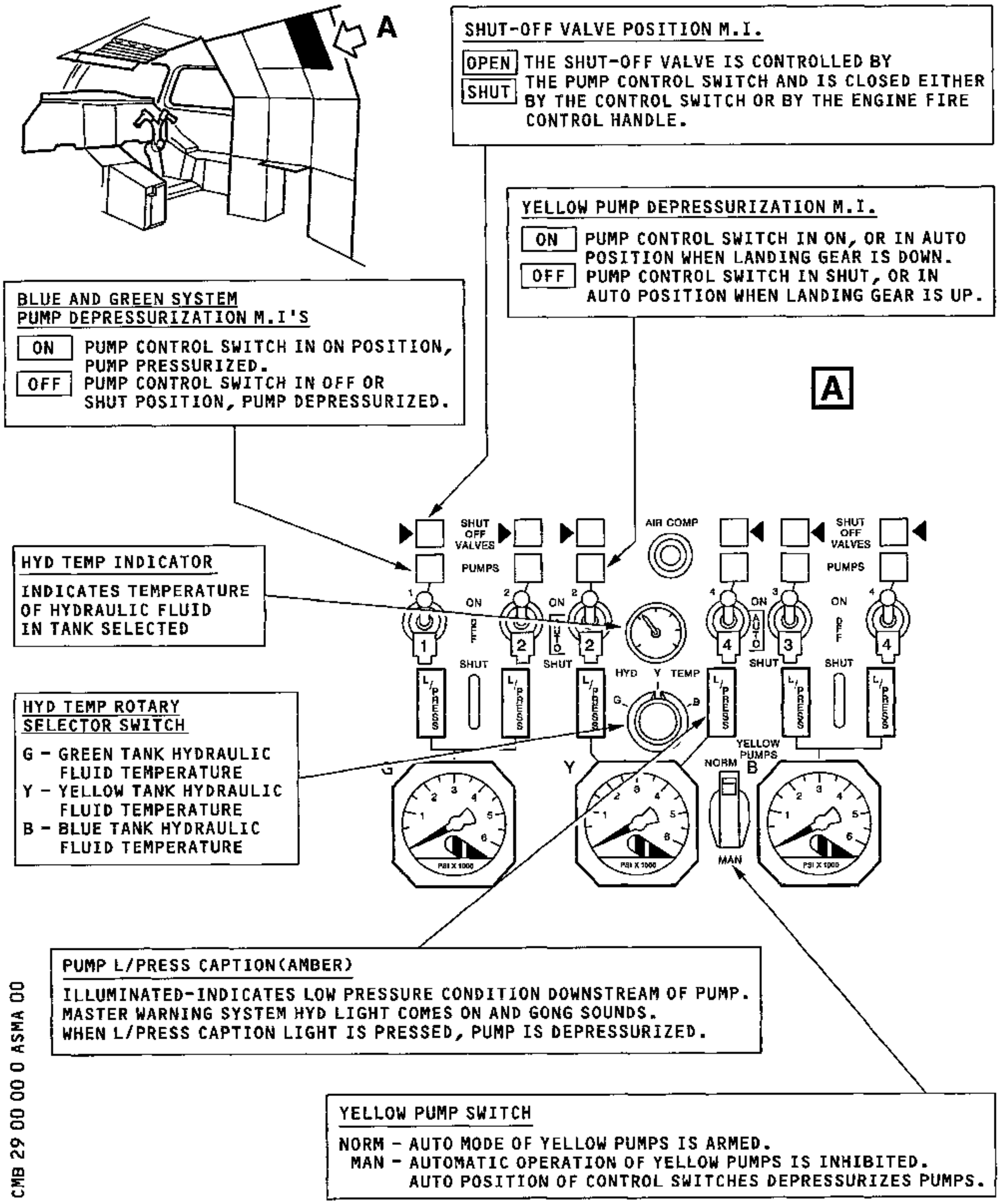
PRINTED IN ENGLAND
CMB 29 00 00 0 AQMA 00



PRINTED IN ENGLAND

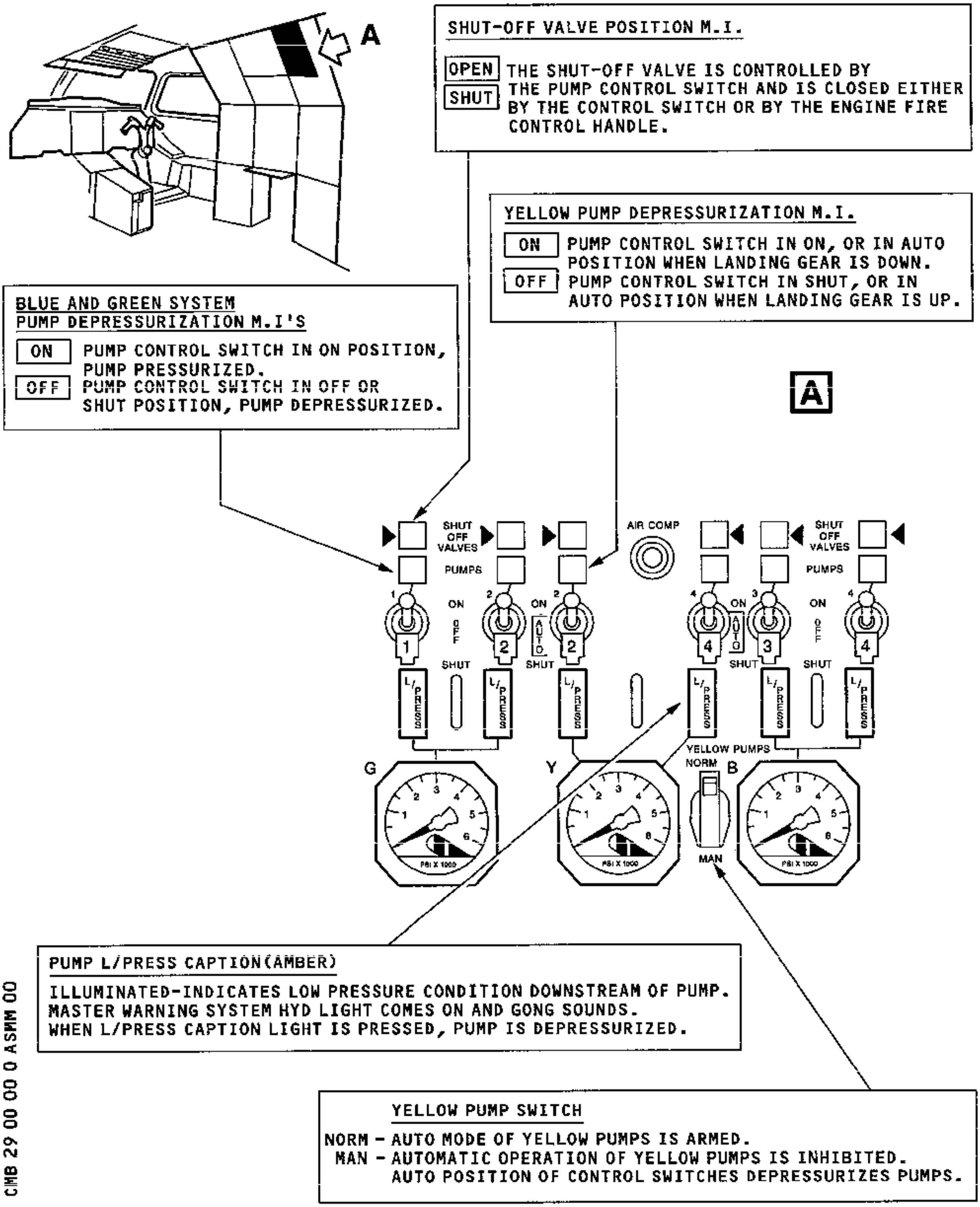
CMB 29 00 00 0 AQMM 00

Hydraulic Management Panel
Figure 008A



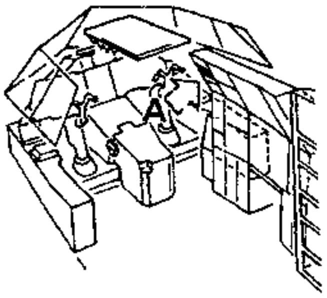
Hydraulic Management Panel
Figure 009

PRINTED IN ENGLAND



CMB 29 00 00 0 ASMM 00

R Hydraulic Management Panel
Figure 009A



CIRCUIT BREAKER

PROTECTION OF
GREEN/YELLOW ELECTRIC PUMP.

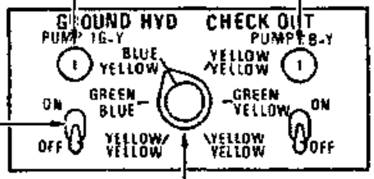
CIRCUIT BREAKER

PROTECTION OF
BLUE/YELLOW ELECTRIC PUMP.

ELECTRIC PUMP CONTROL SWITCH

THESE SWITCHES ARE OF THE MAGNETIC HOLD TYPE, MOVING TO OFF POSITION WHEN GROUND POWER IS DISCONNECTED.
ON - STARTS UP ELECTRIC PUMPS AND DISCONNECTS REAR GALLEY ELECTRICAL POWER SUPPLY.

A



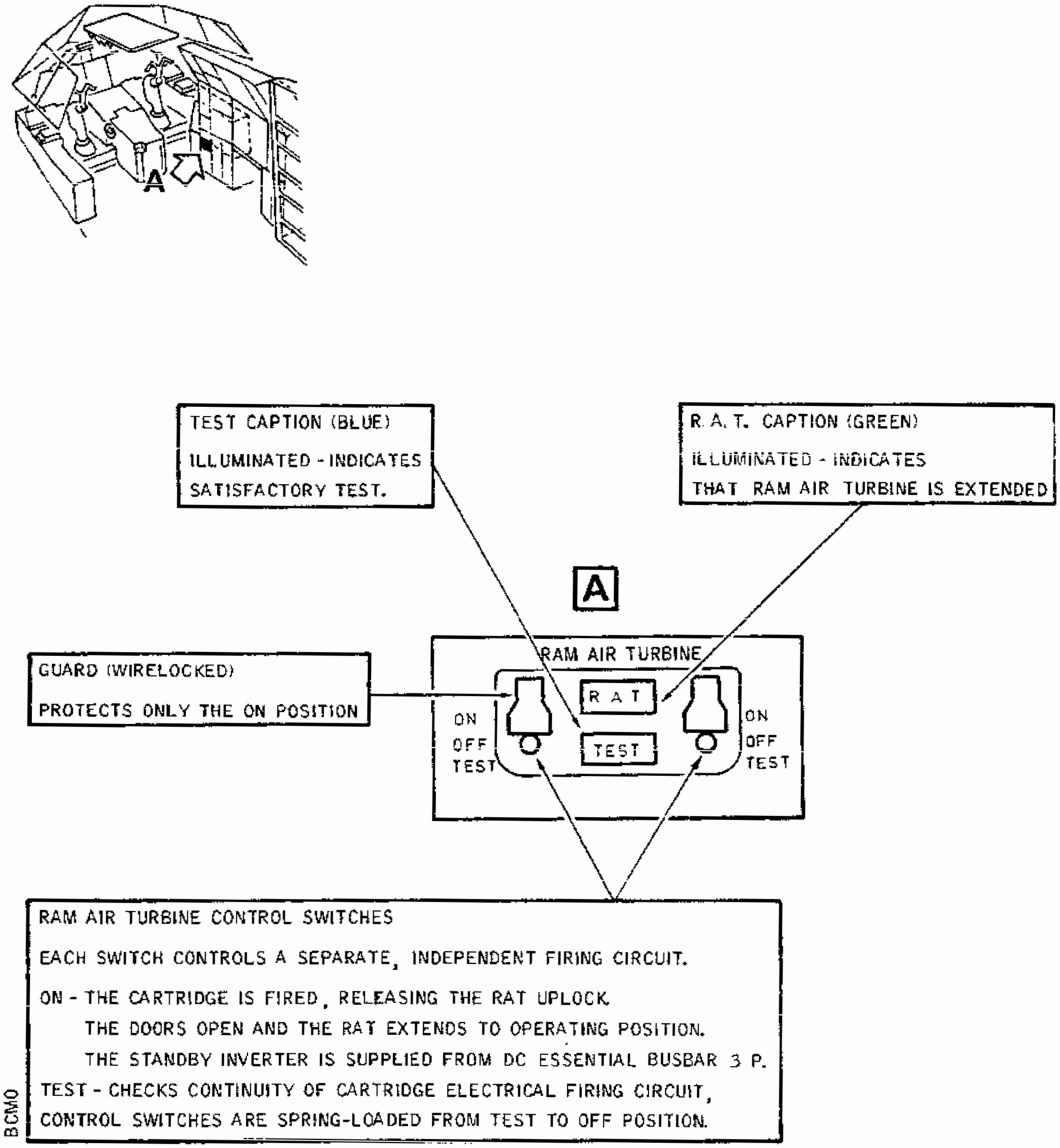
SELECTOR SWITCH FOR PRESSURIZATION OF SYSTEMS ON GROUND

YELLOW YELLOW - BOTH ELECTRIC PUMPS PRESSURIZE YELLOW SYSTEM.
GREEN BLUE - GREEN SYSTEM IS PRESSURIZED BY G - Y ELECTRIC PUMP, BLUE SYSTEM BY B - Y ELECTRIC PUMP.
BLUE YELLOW - BLUE SYSTEM IS PRESSURIZED BY B - Y ELECTRIC PUMP, YELLOW SYSTEM BY B - Y ELECTRIC PUMP.
GREEN YELLOW - GREEN SYSTEM IS PRESSURIZED BY G - Y ELECTRIC PUMP, YELLOW SYSTEM BY B - Y ELECTRIC PUMP.

CMA 29 00 00 0 BAMO

Ground Hydraulic Check Out Panel
Figure 010

Printed in England



CMA 29 00 00 0 BCMO

RAM AIR TURBINE Control Panel
Figure 011

GENERAL - TROUBLE SHOOTING

WARNING : MAKE CERTAIN THAT THE POSITIONS OF NOSE AND MAIN GEAR DOORS CORRESPOND WITH THE ACTUAL POSITIONS OF THE RESPECTIVE OPERATING HANDLES.
HANDLE LOCKED, INDICATOR PLATE SHOWING WHITE : DOORS CLOSED.
HANDLE LOCKED, INDICATOR PLATE SHOWING RED : DOORS OPEN.

MAKE CERTAIN THAT THE LANDING GEAR POSITION INDICATED ON THE GEARS POSITION INDICATING UNIT CORRESPONDS WITH THE ACTUAL POSITION OF THE LANDING GEAR.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE MAKE CERTAIN THAT THE TRAVEL RANGES OF THE CONTROL SURFACES ARE CLEAR.

BEFORE PRESSURIZING HYDRAULIC SYSTEMS, CHECK THAT ALL CONTROLS ARE SET TO CORRESPOND WITH THE ACTUAL POSITION OF THE SERVICES THEY OPERATE.

MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

PRINTED IN ENGLAND

1. Isolation of Faulty Shuttle Valves

A. General

The following trouble shooting procedures are intended to enable isolation of faulty shuttle valves at each servo control, which may cause hydraulic fluid transfer
RB from Yellow to Green, or Yellow to Blue tanks.

RB NOTE: If transfer is from Blue to Yellow, or Green to
RB Yellow refer to MM27-14-00 page 515.

B. Prepare

(1) Equipment and Materials

DESCRIPTION	PART NO.
Electrical Ground Power Unit	
Access Platform 9ft. 8in. (2.960m)	
Hydraulic Fluid Container	
Ground Power Unit - Hydraulic Power and Preliminary Testing	EMH 398E

(2) Take the precautions described in previons WARNING paragraph

(3) Connect electrical ground, power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing)

(4) Open access doors 153BB and 151DB under fuselage

(5) Remove access panel 121FB

(6) Make certain that the following circuit breakers are Set :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
INT 1 MAIN HYD SUP	1-213	1K1950	D 9
INT 2 ST'BY HYD SUP		2K1960	E 9
PFCS INV GRN FAIL IND		1C 73	M15
AUDIO WARN SYS SUP 1		W 371	M21
PFCS ALL SURFACES MON GRN SUP		1C 54	N13
RELAY JACK HYD SEL IND & SUP	1-213	C 281	N17
PEC IND		C 287	N18
MWS SUP 1		W 252	N21
YEL/GRN. GRN FAIL - PFC & RELAY JACK "A" SYS CONT		C 285	P16
YEL/BLUE. BLUE FAIL - PFC & RELAY JACK "A" SYS CONT		C 286	P17
YELL LL-PFC & RELAY "A" SYS CONT		C 288	P18
FLT CONT POSN IND CONT		C 83	R11
FLT CONT POSN IND 26V 400HZ SUP		C 84	B 4
AICU 4B SUP	2-213	4K2051	B14
AICU 1A SUP		1K2050	D14
FLT CONT & NAV BUS		X 355	H 2
AICU 3A SUP		3K2050	H13
AICU 2B SUP		2K2051	H14
YELL L/LEVEL - PFC & RELAY JACK "B" SYS CONT	3-213	C 282	A 8
YELL/GRN. GRN FAIL - PFC & RELAY JACK "B" SYS CONT		C 283	A 9
YELL/BLUE. BLUE FAIL - PFC & RELAY JACK "B" SYS CONT		C 284	A10

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
INT 4 ST!BY HYD SUP	5-213	4K1960	A 6
INT 3 MAIN HYD SUP		3K1950	A 7
AUDIO WARN SYS SUP 2		W 372	C17
MWS SUP 2		W 251	D15
PFCS INV BLUE FAIL IND		2C 73	E11
PFCS ALL SURFACES MON BLUE SUP		2C 54	E12
AICU 2A SUP	13-216	2K2050	A 3
AICU 3B SUP		3K2051	B 3
AICU 1B SUP	14-216	1K2051	A 5
HYD GRND CHECK OUT PUMP CONT		M 656	A16
AICU 4A SUP		4K2050	B 5
INT 2 MAIN HYD SUP	15-215	2K1950	B18
INT 3 ST'BY HYD SUP		3K1960	C18
INT 4 MAIN HYD SUP	15-216	4K1950	A 8
INT 1 ST'BY HYD SUP		1K1960	B 8
HYD GRND CHECK OUT SEL VALVE CONT		M 626	F22

(7) Depressurize the Green, Blue and Yellow hydraulic Systems (Ref. 29-11-00, 29-12-00, 29-21-00, Servicing)

C. Isolation of faulty shuttle valves

(1) Isolating faulty shuttle valves in the event of YELLOW-GREEN fluid transfer

```
*****************************************************
*- Depressurize Green hydraulic system (Ref.29-13-00*
*  Servicing)                                       *
*  NOTE If fluid level varies during depressuriza-  *
*  tion top up reservoir to just above level indica-*
*  tes when pressurized                             *
*- Depressurize Blue and Yellow tanks (Ref.29-13-00,*
*  Servicing)                                       *
*- On each RJ, disconnect and blank off Yellow      *
*  return line                                      *
*- On Flight Engineers AIR INTAKES panel, place air *
*  intake control switch in AUTO position           *
*- Pressurize Blue and Yellow hydraulic systems     *
*  (Ref. 29-12-00 and 29-21-00, Servicing)          *
*  Maintain pressurization for 15 minutes           *
*- Carefully note fluid level in tanks              *
*  Maintain pressure in Blue and Yellow systems for *
*   15 minutes                                      *
*- Check fluid level in Yellow tank :               *
*  A transfer of hydraulic fluid exceeding 0.25 USG *
*  (0.946 L, 0.208 UKG) is observed                 *
*****************************************************
       |      |
       |      |      ***************************************************
       |      |      *Ref chart 5                                      *
      NO     YES-----*Isolation of faulty shuttle valves on spill     *
       |             *door actuators in the event of YELLOW-GREEN     *
       |             *transfer                                         *
       |             ***************************************************
       |
*****************************************************
*- On overhead panel RELAY JACK unit place switch in*
*  BLUE position only                               *
*- On overhead panel servo CONTROLS UNIT place con- *
*  trol switch in YELLOW/GREEN position             *
*- Carefully note fluid level in Yellow tank        *
*- Maintain pressure in Yellow and Blue systems for *
*  15 minutes                                       *
*- Check fluid level in Yellow tank and note any    *
*  possible transfer                                *
*- A transfer of hydraulic fluid exceeding 0.25 USG *
*  0.946 L, 0.208 UKG, is observed                  *
*****************************************************
      |      |
     NO     YES
      |      |
```

```
 |         |
 |         |          ************************************************
 |         |          *Ref. Chart 1                                  *
 |       YES------*Isolation of faulty shuttle valves on PFCUS in  *
 |                    *the event of YELLOW-GREEN transfer            *
 |                    ************************************************
 |
 |                    ************************************************
 |                    *Ref. Chart 3                                  *
NO============---*Isolation of faulty shuttle valves on RTs in    *
                      *the event of YELLOW-GREEN transfer            *
                      ************************************************

*****************************************************
*Final procedure for isolating faulty shuttle valves*
*in the event of YELLOW-GREEN transfer              *
*If the faulty shuttle valves are not isolated on   *
*the RJs proceed as follows :                       *
*- Depressurize Green, Blue and Yellow hydraulic    *
*  systems (Ref. 29-11-00, 29-12-00 and 29-21-00,   *
*  Servicing)                                       *
*- Depressurize Green, Blue and Yellow hydraulic    *
*  tanks (Ref. 29-13-00, Servicing)                 *
*- Remove blanking plugs and connect Yellow return  *
*  line to each RJ as follows :                     *
*- Maintain adaptors screwed into RJ by means of    *
*  appropriate wrench, and tighten union            *
*- Torque to between 2.43 and 2.76 m.daN (17.922    *
*  and 20.356 lbf. ft.)                             *
*- On overhead panel :                              *
*  On SERVO CONTROLS UNIT, place control switch in  *
*  NORMAL position                                  *
*- On RELAY JACK UNIT, place switch in NORM position*
*****************************************************
```

(2) Isolating faulty shuttle valves in the event of YELLOW-BLUE transfer

```
*****************************************************
*- Depressurize the Blue tank (Ref. 29-13-00,       *
*  Servicing)                                       *
*  NOTE If fluid level varies during depressuriza-  *
*  tion top up tank to just above level indicated   *
*  when depressurized                               *
*- Depressurize Green and Yellow tanks (Ref.29-13-00*
*  Servicing)                                       *
*- Disconnect Yellow return line on RJs and blank   *
*  off open line ends                               *
*- On overhead panel SERVO CONTROLS unit place con- *
*  trol switch in NORMAL position                   *
*- On Flight Engineers AIR INTAKES panel place air  *
*  inlet control switches in AUTO position          *
*- Pressurize GREEN and Yellow hydraulic systems    *
*  (Ref. 29-11-00 and 29-21-00, Servicing) and      *
*  maintain pressure for 15 minutes                 *
*- Carefully note fluid level in Yellow tank        *
*- Maintain pressure in Green and Yellow systems    *
*  for 15 minutes                                   *
*- Check fluid level in Yellow tank :               *
*  A transfer of fluid exceeding 0.25 USG (0.946 L, *
*  0.208 UKG) is observed                           *
*****************************************************
    |      |
    |      |      *****************************************************
    |      |      *Ref. Chart 6                                       *
   NO     YES-----*Isolation of faulty shuttle valves on spill door*
    |             *actuators in the event of YELLOW-BLUE transfer   *
    |             *****************************************************
    |
*****************************************************
*On overhead panel                                  *
*- On RELAY JACK UNIT, place switch in GREEN posi-  *
*  tion only                                        *
*- On SERVO CONTROLS UNIT place control switch in   *
*  YELLOW-GREEN position                            *
*- Carefully note fluid level in Yellow tank        *
*- Maintain pressure in the Green and Yellow systems*
*  for 15 minutes                                   *
*  Check fluid level in Yellow tank. A transfer of  *
*  fluid exceeding 0.25 USG (0.946 L, 0.208 UKG) is *
*  observed                                         *
*****************************************************
    |      |
   NO     YES
    |      |
```

```
      |         |
      |         |         ************************************************
      |         |         *Ref. Chart 2                                  *
      |      YES-------*Isolation of faulty shuttle valves on PFCUS in  *
      |                   *the event of YELLOW-BLUE transfer             *
      |                   ************************************************
      |
      |                   ************************************************
      |                   *Ref. Chart 4                                  *
     NO--------------*Isolation of faulty shuttle valves on RJs in    *
                          *the event of YELLOW-BLUE transfer             *
                          ************************************************

*****************************************************
*- Final procedure for isolating faulty shuttle     *
*  valves in the event of YELLOW-BLUE transfer      *
*  If the faulty shuttle valves are not isolated on *
*  the RJs proceed as follows :                     *
*- Depressurize Green, Blue and Yellow hydraulic     *
*  systems (Ref. 29-11-00, 29-12-00 and 29-21-00,   *
*  Servicing)                                       *
*- Depressurize Green, Blue and Yellow hydraulic     *
*  tanks (Ref. 29-13-00, Servicing)                 *
*- Remove Blanking plugs and connect Yellow return   *
*  line to each RJ as follows :                     *
*- Maintain adaptors screwed into RJ by means of     *
*  appropriate wrench and tighten union             *
*- Torque to between 2.43 and 2.76 m.daN (17.922     *
*  and 20.356 lbf.ft.)                              *
*- On overhead panel :                               *
*  On SERVO CONTROLS UNIT, place control switch in  *
*  NORMAL position                                  *
*- On RELAY JACK UNIT, place switch in NORM position*
*****************************************************
```

Isolation of faulty shuttle valve on PFCUs in the event of YELLOW-GREEN transfer

GROUND EQUIPMENT REQUIRED	
DESCRIPTION	PART No.
HYDRAULIC FLUID RECOVERY HOSE	
BLANKING PLUGS	MS 21913-5
	MS 21913-6
	AN 806-C-6

*Depressurize Green, Blue and Yellow hydraulic systems (Ref. 29-11-00, 29-12-00 and 29-21-00, Servicing)
*Depressurize Green, Blue and Yellow hydraulic tanks (Ref. 29-13-00, Servicing)
*Remove the following fairings : 351CL, 352CR
551JB, 552JB, 553JB - 651JB, 652JB, 653JB
*On each PFCU, disconnect the following fluid lines
*ELEVONS PFCU Green return and green pressure
*RUDDER Green return and green pressure. Blank off above lines as follows :
*ELEVONS PFCU Green return-Blanking plugs MS 21913-8
Green pressure-Blanking plugs MS 21913-6
*RUDDER Green return-Blanking plugs MS 21913-8
Green pressure-Blanking plugs AN 806-6-6
*Connect fluid recovery hose to shuttle valve unions
*Pressurize Yellow hydraulic system (Ref. 29-21-00, Servicing); measure leakage at each shuttle valve

*Replace shuttle valve assemblies when leakage from the valve exceeds 0.25 USG/ 15 min (0.946 L/15 min, 0.208 UKG/ 15 min) (Ref. Removal/Installation of shuttle valve assembly) as follows :
*27-34-52 MIDDLE and OUTER ELEVON PFCU
*27-34-53 INNER ELEVON PFCU
*27-24-31 RUDDER PFCU
*Remove blanking plugs and fluid recovery hoses
*Connect aircraft lines to adaptors on shuttle valves, as per above topics

Chart 1

Isolation of faulty shuttle valves on PFCUs in the event of YELLOW-BLUE transfer

GROUND EQUIPMENT REQUIRED	
DESCRIPTION	PART No.
HYDRAULIC FLUID RECOVERY HOSE	
BLANKING PLUGS	MS 21913-8
	MS 21913-6
	AN 806-C-8
	AN 806-C-6

*Depressurize Green, Blue and Yellow hydraulic systems (Ref. 29-11-00, 29-12-00 and 29-21-00, Servicing)
*Depressurize Green, Blue and Yellow hydraulic tanks (Ref. 29-13-00, Servicing)
*Remove the following fairings : 351CL, 352CR
551JB, 552JB, 553JB - 651JB, 652JB, 653JB
*On each PFCU, disconnect the following fluid lines
*ELEVONS PFCU Blue return and Blue pressure
*RUDDER Blue return and Blue pressure
*Blank above lines as follows :
*ELEVONS PFCU Blue return-Blanking plugs MS 21913-8
Blue pressure-Blanking plugs MS 21913-6
*RUDDER Blue return-Blanking plugs MS 21913-8
Blue pressure-Blanking plugs AN 806-6-6
*Connect fluid recovery hose to shuttle valve unions
*Pressurize Yellow hydraulic system (Ref. 29-21-00, Servicing); measure leakage at each shuttle valve

*Replace shuttle valve assemblies when leakage from the valve exceeds 0.25 USG/ 15 min.
(0.946 L/ min, 0.208 UKG/ 15 min.)
(Ref. Removal/Installation of shuttle valve assembly as follows :
*27-34-52 Middle and outer elevon PFCU
*27-37-53 Inner elevon PFCU
*27-24-31 Rudder PFCU
*Remove blanking plugs and fluid recovery hoses
*Connect aircraft lines to unions on shuttle valves, as per above topics.

Chart 2

Isolation of faulty shuttle valves on RJs in the event of YELLOW-GREEN transfer

GROUND EQUIPMENT REQUIRED	
DESCRIPTION	PART No.
HYDRAULIC FLUID RECOVERY HOSE	
BLANKING PLUGS	AN 806-C-5 MS 21913-4

Depressurize Green, Blue and Yellow hydraulic systems (Ref. 29-11-00, 29-12-00 and 29-21-00, Servicing)
Depressurize Green, Blue and Yellow hydraulic tanks (Ref. 29-13-00, Servicing)
On each RJ, disconnect Green return and Green pressure lines. Blank off these lines as follows :
Green return-Blanking plugs AN 806-6-5
Green pressure-Blanking plugs MS 21913-4
Connect fluid recovery hose to shuttle valve adaptors
Pressurize Yellow system (Ref. 29-21-00, Servicing) and measure the leakage rate from each shuttle valve

Replace the RJ on which Shuttle valve leakage exceeds 0.25 USG/15 min/ (0.946L/15 min, 0.208/ UKG/15min).
Ref. 27-14-12 Roll RJ, Removal/Installation
27-14-12 Yaw RJ, Removal/Installation
27-34-14 Pitch RJ Removal/Installation
Remove blanking plugs and fluid recovery hoses
Connect aircraft lines to adaptors on shuttle valve assemblies, according to the procedure described in the topics above

Chart 3

Isolation of faulty shuttle valves on RJs in the event of YELLOW-BLUE transfer

GROUND EQUIPMENT REQUIRED	
DESCRIPTION	PART No.
HYDRAULIC FLUID RECOVERY HOSE	
BLANKING PLUGS	AN 806-C-5 MS 21913-4

Depressurize Green, Blue and Yellow hydraulic systems (Ref. 29-11-00, 29-12-00 and 29-21-00, Servicing)
Depressurize Green, Blue and Yellow hydraulic tanks (Ref. 29-13-00, Servicing)
On each RJ, disconnect Blue return and Blue pressure lines. Blank off these lines as follows .
Blue return-blanking plugs AN 806-6-5
Blue pressure-blanking plugs MS 21913-4
Connect fluid recovery hose to shuttle valve adaptors
Pressurize Yellow system (Ref. 29-21-00, Servicing) and measure the leakage rate from lach shuttle valve.

→

Replace the RJ on which shuttle valve leakage exceeds 0.25 USG/15 min, (0.946 L 15/min, 0.208/ UKG/ 15 min).
Ref. 27-14-12 Roll RJ, Removal/Installation
27-14-12 Yaw RJ, Removal/Installation
27-34-14 Pitch RJ Removal/Installation
Remove blanking plugs and fluid recovery hoses
Connect aircraft lines to adaptors on shuttle valve assemblies according to the procedure described in the topics above

Chart 4

```
*************************************-----------------------------
*Isolation of faulty shuttle valves  *|GROUND EQUIPMENT REQUIRED    |
*on spill door actuators in the event*|-----------------------------|
*of YELLOW-GRENN transfer            *|DESCRIPTION         PART No. |
*************************************|-----------------------------|
                                      |                             |
                                      |HYDRAULIC FLUID              |
                                      |RECOVERY HOSE                |
                                      |BLANKING PLUGS               |
                                       -----------------------------

*****************************************************
*Depressurize Green, Blue and Yellow hydraulic      *
*systems (Ref. 29-11-00, 29-12-00 and 29-21-00,     *
*Servicing)                                         *
*Depressurize Green, Blue and Yellow hydraulic      *
*tanks (Ref. 29-13-00, Servicing)                   *
*Remove the following access panels                 *
*411HL, 421HR                                       *
*Disconnect the following lines from each spill door*
*actuator :                                         *
*Green return and Green pressure.                   *
*Blank off these lines with blanking plugs          *
*Connect a fluid recovery hose to shuttle valve     *
*adaptors                                           *
*Pressurize Yellow hydraulic system (Ref. 29-21-00, *
*Servicing) and measure the leakage rate from each  *
*shuttle valve                                      *
*****************************************************
    |
    |              **************************************************
    |              *Replace spill door actuators when leakage from  *
    |              *the shuttle valve exceeds 0.25 USG/ 15 min,     *
    |              *(0.946 L/15 min. 0.208 UKG/15 min) Ref. 71-64-11*
    |              *Removal/Installation                            *
    |              *Remove blanking plugs and fluid recovery hoses  *
    |--------------*Connect aircraft lines to adaptors on shuttle   *
                   *valves, according to the procedure described in *
                   *the topics above                                *
                   **************************************************
```

Chart 5

```
*************************************-------------------------------
*Isolation of faulty shuttle valves *|GROUND EQUIPMENT REQUIRED    |
*on spill door actuators in the event*|----------------------------|
*of YELLOW-BLUE transfer            *|DESCRIPTION       PART No.  |
*************************************|----------------------------|
                                     |                            |
                                     |HYDRAULIC FLUID             |
                                     |RECOVERY HOSE               |
                                     |BLANKING PLUGS              |
                                      -----------------------------

*****************************************************
*Depressurize Green, Blue and Yellow hydraulic      *
*systems (Ref. 29-11-00, 29-12-00 and 29-21-00,     *
*Servicing)                                         *
*Depressurize Green, Blue and Yellow hydraulic      *
*tanks (Ref. 29-13-00, Servicing)                   *
*Remove the following access panels :               *
*431HL, 441 HR                                      *
*Disconnect the following lines from each spill door*
*actuator :                                         *
*Blue return and Blue pressure.                     *
*Blank off these lines with blanking plugs          *
*Connect a fluid recovery hose to shuttle valve     *
*adaptors                                           *
*Pressurize Yellow hydraulic system (Ref. 29-21-00, *
*Servicing) and measure the leakage rate from each  *
*Shuttle valve.                                     *
*****************************************************
    |
    |              **************************************************
    |              *Replace spill door actuators when leakage from  *
    |              *the shuttle valve exceeds 0.25 USG/ 15 min,     *
    |              *(0.946 L/15 min, 0.208 UKG/15 min) Ref. 71-64-11*
    |--------------*Removal/Installation.                           *
                   *Remove blanking plugs and fluid recovery hoses  *
                   *Connect aircraft lines to adaptors on shuttle   *
                   *valves, according to the procedure described in *
                   *the topics above.                               *
                   **************************************************
```

Chart 6

D. Close-Up

(1) De-energize the aircraft electrical network and disconnect electrical ground power unit (Ref. 24-41-00, Servicing)

(2) Close access doors and panels

(3) Remove access platforms

PRINTED IN ENGLAND

GENERAL - SERVICING

WARNING: MAKE CERTAIN THAT THE POSITIONS OF NOSE AND MAIN GEAR DOORS CORRESPOND WITH THE ACTUAL POSITIONS OF THE RESPECTIVE OPERATING HANDLES.
HANDLE LOCKED, INDICATOR PLATE SHOWING WHITE : DOORS CLOSED.
HANDLE LOCKED, INDICATOR PLATE SHOWING RED : DOORS OPEN.

MAKE CERTAIN THAT THE LANDING GEAR POSITION INDICATED ON THE GEARS POSITION INDICATING UNIT CORRESPONDS WITH THE ACTUAL POSITION OF THE LANDING GEAR.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE MAKE SURE THAT THE TRAVEL RANGES OF THE CONTROL SURFACES ARE CLEAR.

BEFORE PRESSURIZING HYDRAULIC SYSTEMS, CHECK THAT ALL CONTROLS ARE SET TO CORRESPOND WITH THE ACTUAL POSITION OF THE SERVICES THEY OPERATE.

MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

RB IF MORE THAN ONE HYDRAULIC PIPE IS DISCONNECTED IN THE
RB SAME AREA, A FULL FUNCTION CHECK OF THE DISTURBED
RB SYSTEM(S) MUST BE CARRIED OUT AFTER RECONNECTION.

1. Precautions to be Observed When Handling CHEVRON M2.V Hydraulic Fluid

WARNING: UNDER NO CIRCUMSTANCES MUST CHEVRON M2.V HYDRAULIC FLUID BE MIXED WITH WATER OR ANY OTHER FLUID.

It is advisable to wear suitable goggles to prevent fluid splashing into the eyes. If fluid does splash into the eyes irrigate them immediately with clean, cold water and consult the medical staff.

All equipment used for handling hydraulic fluid must always be perfectly clean.

2. Filter Elements - Hydraulic Tank Return Filter Assemblies (Ref. Fig. 301 and 302)

The filler elements are contained in a casing. An isolation valve enables the casing to be drained without it being necessary to drain the tank. The removal/installation procedure for the filter elements is identical for the filter of each of the three tanks.

The tank return filter assemblies are located in zone 153.

A. Equipment and Materials

DESCRIPTION	PART NO.
Ground power unit - hydraulic - power and preliminary testing	EMH398E
Container	-
Hydraulic fluid (Ref. 20-30-00, No.011)	-
Special product (Ref. 20-30-00, No.109)	-
Drainage equipment - return filter assy - hydraulic tank	-
Corrosion resistant steel lockwire, dia. 0.8 mm (0.032 in)	-
Access platform - 10 ft 9 in (3.282 meters)	-

PRINTED IN ENGLAND

B. Prepare

(1) Open following access doors under the fuselage:
153BB, for removal/installation of filter element in Blue system tank return filter.
153AB and 153BB, for removal/installation of filter element in Green and Yellow system tank return filters.

(2) Depressurize tank associated with filter element to be removed (Ref. 29-13-00, Servicing).

(3) Open access door 151DB under the fuselage and depressurize relevant hydraulic system actuating control lever of associated pressure relief and manual unloading valve.

(4) Tighten tank depressurization valve, and secure with safety pin.

C. Removal of Filter Elements

(1) Remove safety pin (10).

(2) Unscrew knurled knob (9). This operation closes the isolation valve and opens the filter drain ports.

(3) Install tool D921596000 and allow fluid to drain into container provided until filter is completely drained.

(4) Remove tool D921596000, cut and remove lockwire, and remove quick-release clamp (3).

(5) Remove filter base (8).

(6) Remove filter element (2) ; avoid knocking it against filter casing (1).

(7) Remove the three bleed filters (4) located below the top of casing (1), by removing screws (7), washers (6), and stops (5). Withdraw filters (4).

(8) Remove circlips (14) from valves (11) on filter base (8), part the half-shells (13) and remove filters (12).

NOTE : If filter elements are removed subsequent to filter clogging, they shall be replaced by new or reconditioned elements.

D. Install

WARNING : SEALS AND MECHANICAL COMPONENTS IN CONTACT WITH HYDRAULIC FLUID MUST BE LUBRICATED WITH PRODUCT No.011 BEFORE INSTALLATION. THE USE OF ANY KIND OF GREASE OR LUBRICATING OIL IS PROHIBITED.

ALL SCREWS MUST BE SAFETIED WITH PRODUCT No.109.

(1) Position the three bleed filters (4) at top of casing and secure them with stops (5), washers (6) and screws (7).

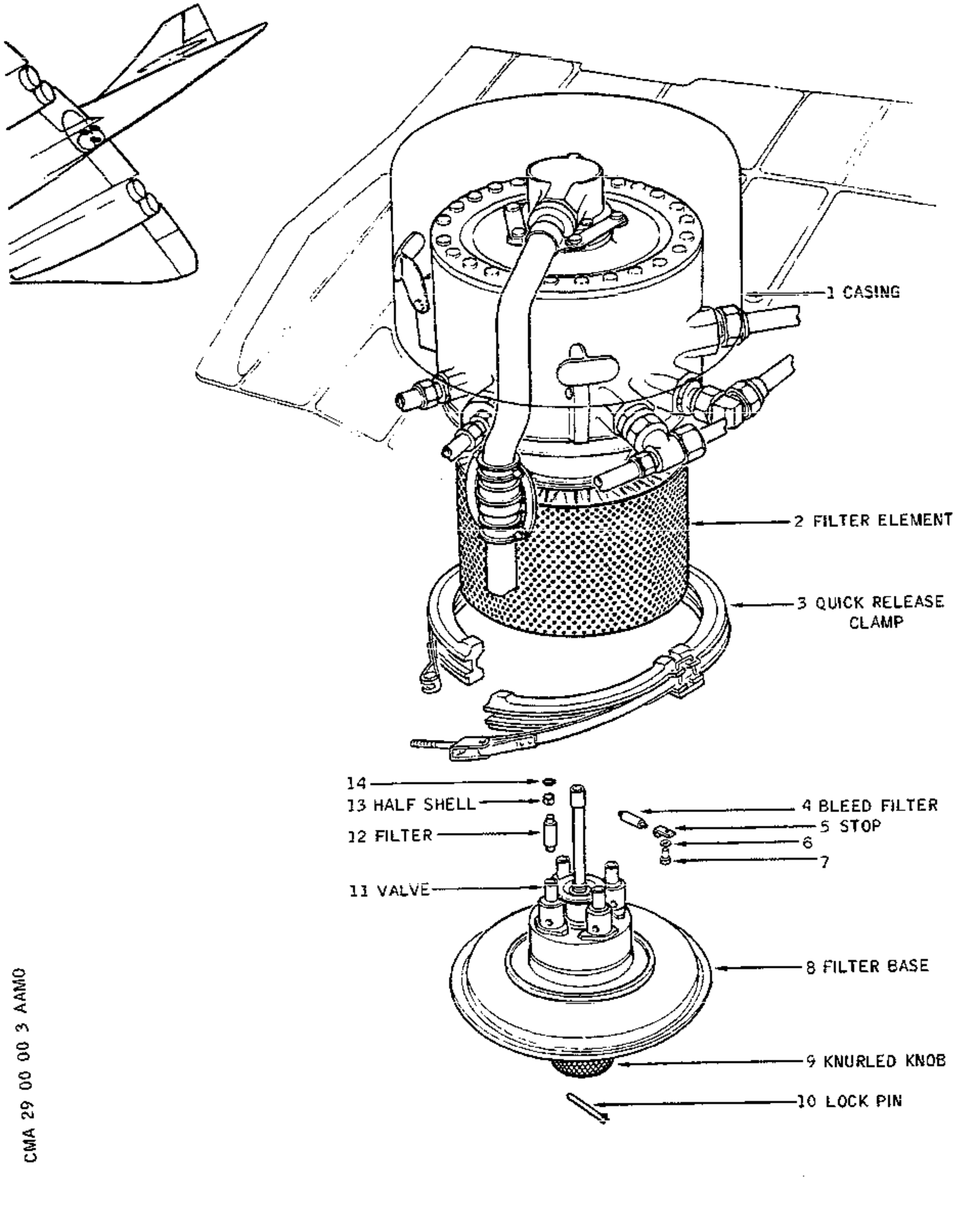
(2) Fit filters (12) in each of the four valves (11), install half shells (13) and circlips (14).

NOTE : (1) The ends of each bleed filter cartridge are of a different diameter to ensure installation in correct position.
(2) All seals should be checked and replaced where necessary.

(3) Change seal at bottom of casing if necessary.

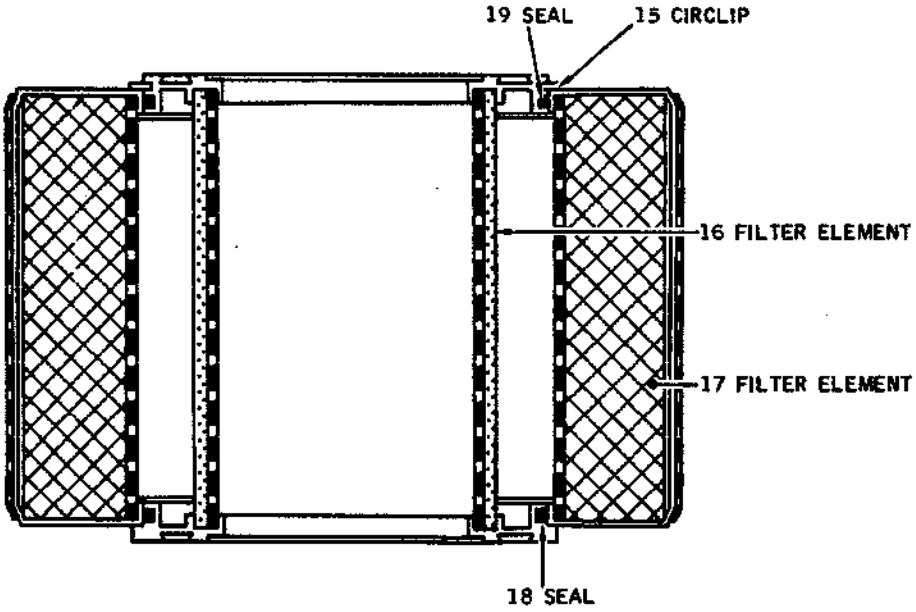
(4) Assemble the two filter elements (17) and (16) with circlip (15). Change seals (18) and (19) if necessary.

(5) Place filter element in casing (1) ; avoid knocking



Tank Return Filters
Figure 301

R



CMA 29 00 00 3 ACMO

Filter Element (2)
Figure 302

it against casing body.

(6) Install base (8) on casing (1). Engage it carefully.

(7) Install and attach quick release clamp (3). Torque to 44.24 lbf.in. (0.5 m.daN), then wirelock and seal.

(8) Tighten knurled knob (9) and secure with safety pin (10).

(9) Replenish hydraulic tank as required (Ref. 12-12-29).

E. Test

(1) Pressurize tanks to 65 psi (4.5 bars) (Ref. 29-13-00, Servicing).

(2) Pressurize relevant systems :
Green system (Ref. 29-11-00, Servicing)
Blue system (Ref. 29-12-00, Servicing)
Yellow system (Ref. 29-21-00, Servicing)

(3) Operate flight controls in mechanical mode (Ref. 27-00-00, Servicing).

(4) Check filter for external leakage.

F. Close-Up

(1) Close access doors.

(2) Remove access platform.

3. Filter Elements - System
(Ref. Fig. 303)

B CAUTION : TO AVOID DAMAGING FILTER BODY THREAD, ENSURE ALL
B LOCKING WIRE IS REMOVED FROM FILTER BOWL BEFORE
B UNSCREWING BOWL.

The filters installed on the HP and case drain lines are basically identical in design.

Removal of the bowl closes an isolation valve allowing the filter element to be removed without it being necessary to drain the system.

Location of HP and Case Drain Filters

REF	DESCRIPTION	PANEL	ACCESS ZONE	ACCESS DOOR
3127	Filter - Eng. 1 Green Hyd. Sys. Pump Delivery		411	JL
3140	Filter - Eng. 1 Green Hyd. Sys. Pump Case Drain		532	CT
3126	Filter - Eng. 2 Green Hyd. Sys. Pump Delivery		421	JR
3139	Filter - Eng. 2 Green Hyd. Sys. Pump Case Drain		531	BT
3763	Filter - HP (Artificial Feel Delivery, Green Hyd. Sys.)		121	GB
3226	Filter - Eng. 3 Blue Hyd. Sys. Pump Delivery		431	JL
3239	Filter - Eng. 3 Blue Hyd. Sys. Pump Case Drain		631	BT
3227	Filter - Eng. 4 Blue Hyd. Sys. Pump Delivery		441	JR
3238	Filter - Eng. 4 Blue Hyd. Sys. Pump Case Drain		631	BT
3783	Filter - HP (Artificial Feel Delivery, Blue Hyd. Sys.)		121	GB
3325	Filter - Eng. 2 Yellow Hyd. Sys. Pump Delivery		421	JR
3336	Filter - Eng. 2 Yellow Hyd.		531	BT

REF	DESCRIPTION	PANEL	ACCESS ZONE	ACCESS DOOR
	Sys. Pump Case Drain			
4026	Filter - Eng. 4 Yellow Hyd. Sys. Pump Delivery		441	JR
3337	Filter - Eng. 4 Yellow Hyd. Sys. Pump Case Drain		631	BT
4132	Filter - Green/Yellow Electric Pump Delivery		541	AB
4320	Filter = Green/Yellow electric Pump Case Drain		541	AB
4131	Filter - Blue/Yellow Electric Pump Delivery		641	AB
4319	Filter - Blue/Yellow Electric Pump Case Drain		641	AB
5081	Filter - Ram Air Turbine Green Hyd. Sys. Delivery Line		542	AB
5082	Filter - Ram Air Turbine Yellow Hyd. Sys. Delivery Line		542	AB

A. Equipment and Materials

DESCRIPTION	PART NO.
Ground Power Unit - Hydraulic - Power and Preliminary Testing	EMH398E
Container	
Hydraulic Fluid (Ref. 20-30-00, No.011, Table of Products)	
Access Platform - 10 ft. 9 in. (3.282 meters)	

B. Prepare

(1) Open access door 153BB under fuselage and depressurize tanks by loosening the knurled knob on associated depressurization valve.

(2) Open access door 151DB under fuselage and depressurize relevant hydraulic system.

(3) Tighten tank depressurization valves, and secure with safety pins.

C. Remove Filter Element

(1) Unscrew and remove bowl (1).

(2) Remove filter element (2).

B CAUTION : VISUAL INSPECTION OF FILTER ELEMENTS CAN BE
B MISLEADING. IF CONTAMINATION IS SUSPECTED THE
B ELEMENT MUST BE CHANGED. THIS IS PARTICULARLY
B IMPORTANT FOLLOWING A HYDRAULIC PUMP FAILURE
B WHEN THE PRESSURE AND CASE DRAIN FILTER ELE-
B MENTS MUST BE CHANGED BEFORE THE REPLACEMENT
B PUMP IS OPERATED.

NOTE : If filter element has been removed due to failure of the engine driven pump, or if there is the slightest possibility of clogging or damage replace it with a new or reconditioned element. If particles are present in case drain filters, refer to paragraph 7.

D. Install Filter Element

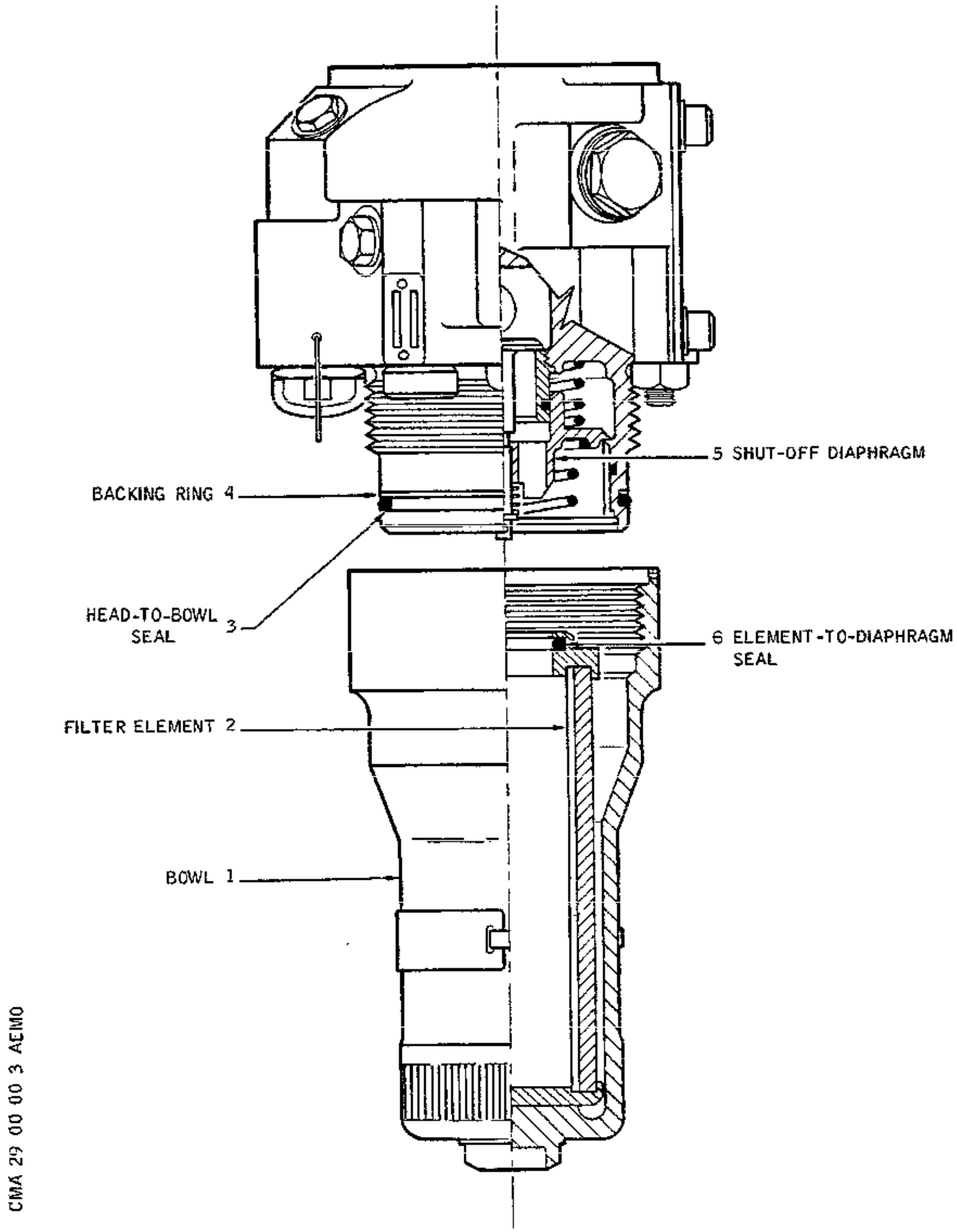
(1) Make certain that head to bowl seal (3) backing ring (4) and element to diaphragm seal (6) are undamaged, free from foreign matter and correctly fitted. Make certain that element removal spring is correctly located in the base of diaphragm (5).

NOTE : (1) If a new backing ring is installed, proceed as shown in figure.

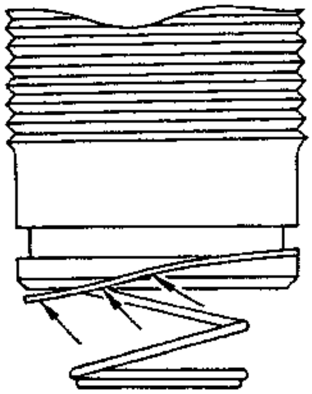
(2) During assembly the seals must only be lubricated with product No.011.
(Ref. Fig. 304)

(2) Locate element (2) in filter bowl (1).

(3) Fill the filter bowl with Product No.011.



Filter Element (System Filters)
Figure 303



CMA 29 00 00 3 AFM0

Backing Ring
Figure 304

CAUTION : DO NOT FILL THROUGH OPEN END OF FILTER ELEMENT.

(4) Make certain element is correctly located on diaphragm. Screw filter bowl to filter head. Torque to 40 lbf.in. (0.460 m.daN).

(5) Replenish hydraulic tank as required (Ref. 12-12-29).

E. Close-Up

(1) Close access doors.

(2) Remove access platforms.

4. Accumulator Charging
(Ref. Fig. 305)

Each accumulator is fitted with a charging valve and pressure gauge. The charging procedure is identical for all the accumulators. Hydraulic system accumulator charging pressure is 2294 psi (158 bars) for an ambient temperature of 68°F (20°C). The accumulators are located in zone 151 and are accessible through door 151DB.

A. Equipment and Materials

DESCRIPTION	PART NO.
Air/Hydraulic Tool Kit (NATO Standard)	
Nitrogen Bottle, Pressure between 2900 and 3620 psi (200 and 250 bars)	
Access Platform - 10 ft. 9 in. (3.282 meters)	

B. Prepare

(1) Position access platform.

(2) Open access door 151DB under the fuselage and depressurize hydraulic systems by actuating control lever of associated pressure relief and manual unloading valve.

(3) Assemble a charging circuit as shown in the figure using components provided in the air/hydraulic tool kit.

C. Charging

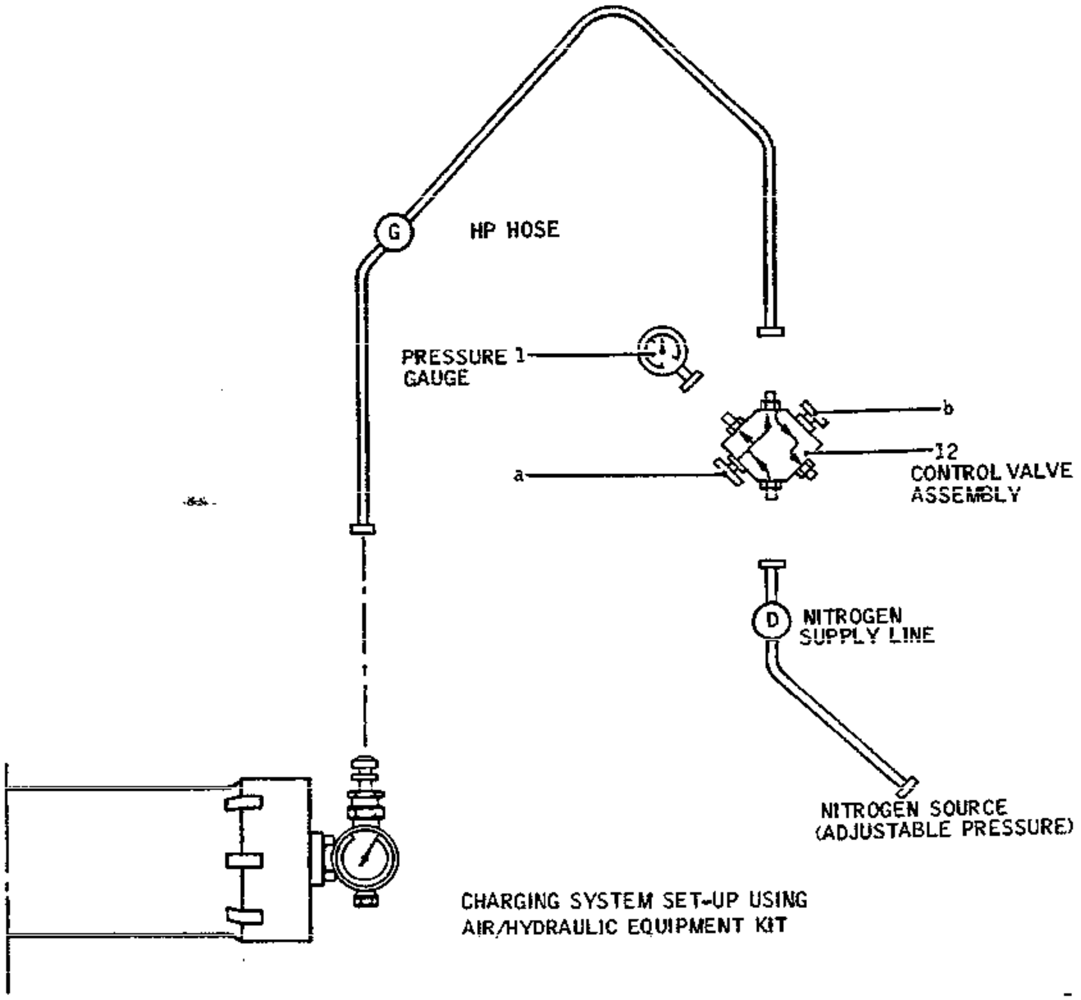
NOTE : This charging method is for an ambient temperature of + 20°. Charging pressures corresponding to various temperatures are indicated on a plate located near the accumulators.

(1) Remove charging valve cap.

(2) Connect charging circuit hose to charging valve.

(3) Place control valve assembly (12) in following configuration :

(4) Valves (a) and (b) closed.



CHARGING SYSTEM SET-UP USING
AIR/HYDRAULIC EQUIPMENT KIT

PLATE INDICATING CHARGING
PRESSURES FOR GREEN, BLUE AND
YELLOW SYSTEM ACCUMULATORS

NITROGEN PRESSURE	
-20	1848 PSI
-10	1952 PSI
0	2055 PSI
+10	2175 PSI
+20	2294 PSI
+30	2390 PSI
+40	2484 PSI
+60	2645 PSI

CMA 29 00 00 3 AGM0

Accumulator Charging
Figure 305

Bleed valve caps removed.

(5) Adjust nitrogen pressure at source to 2294 psi (158 bars) and open valve of source.

(6) Unscrew accumulator charging valve control nut one and a half turns.

(7) Open valve (a) on control valve assembly very slowly and monitor the pressure on pressure gauge. Wait a few minutes for it to stabilize.

(8) Release hydraulic pressure in the system concerned by operating manual unloading plunger on pressure relief valve. Keep pressure at zero until nitrogen pressure in the accumulator stabilizes at 2294 psi (158 bars).

(9) Close accumulator charging valve by tightening control nut.

(10) Shut off nitrogen supply, open valve (b) on control valve assembly (12) to release pressure in hose.

(11) Disconnect charging circuit hose and screw cap on valve.

D. Close-Up

(1) Close access doors.

(2) Remove access platform.

RB 5. Draining of Tank Depressurization Valve Sight Glasses

RB The tank depressurization valve sight glasses are located in
RB zone 153BB.

RB A. Equipment and Materials

DESCRIPTION	PART NO.
Container	-
Access platform - 10 ft 9 in (3.282 metres)	-
Lockwire 0.032 in (0.812 mm) dia. corrosion resistant steel	-

RB B. Prepare

RB (1) Position access platform.

RB (2) Open access door 153BB under fuselage.

RB C. Draining

RB (1) Cut and remove lockwire on valve.

RB (2) Unscrew knurled knob to vent pressurized air.

RB (3) Unscrew complete valve assembly from tank.

RB WARNING: OBSERVE ALL NORMAL HEALTH AND SAFETY PRECAUTIONS
RB WHEN USING SOLVENTS OR COMPRESSED AIR.

RB CAUTION: DO NOT USE CHLORINE BASED SOLVENTS TO CLEAN
RB ASSEMBLY.

RB (4) Remove all hydraulic fluid from valve assembly.

RB (5) Replace valve assembly onto tank and tighten.

RB (6) Tighten knurled knob.

RB (7) Wirelock valve.

RB (8) Replenish and pressurize hydraulic tank as required
RB (Ref. 12-12-29 and 29-13-00, Servicing).

RB D. Close-Up

RB (1) Close access doors.

RB (2) Remove access platform.

PRINTED IN ENGLAND

R 6. Draining of Tank De-aerator Safety Valves

The tank de-aerator safety valves are located in zone 153BB.

A. Equipment and Materials

DESCRIPTION	PART NO.
Container	-
Access platform - 10 ft 9 in (3.282 meters)	-
Lockwire 0.032 in (0.812 mm) dia. corrosion resistant steel	-

B. Prepare

(1) Position access platform.

(2) Open access door 153BB under fuselage.

C. Draining

(1) Cut and remove lockwire on lower plug.

(2) Unscrew plug until fluid flows.

(3) Press upper indicator.

(4) Check that all the fluid flows out freely.

(5) Tighten lower plug.

(6) Wirelock lower plug.

D. Close-Up

(1) Close access doors.

(2) Remove access platform.

PRINTED IN ENGLAND

R 7. Isolate Hydraulic Tank De-Aerator Safety Valve

A. General

This paragraph describes the procedure to be adopted following a leakage from hydraulic tank de-aerator safety valve.

B. Equipment and Materials

DESCRIPTION	PART NO.
Cap assembly AN929-4	-
Access platform, 10 ft 9 in (3.282 mm)	-
Container	-
Flexible vinyl hose	-
Circuit breaker safety clips	-

C. Prepare

(1) Open access door 151DB, depressurize hydraulic system corresponding to de-aerator system involved.

(2) Open access door 153BB.

(3) Depressurize relevant hydraulic system (Ref. 29-13-00, Servicing).

(4) Close tank depressurization valve and secure with safety pins.

(5) Trip, safety and tag the following circuit breaker:

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
HYD GRND CHECK OUT SEL VALVE CONT	15-216	M 626	F22

PRINTED IN ENGLAND

WARNING: INSTALL WARNING NOTICES ON ENGINES 1, 2 AND 3 PROHIBITING PRESSURIZATION OF THE BLUE, GREEN AND YELLOW HDYRAULIC SYSTEMS BY THE HYDRAULIC GROUND POWER UNIT. ALSO INSTALL A WARNING NOTICE AT FLIGHT ENGINEER STATION PROHIBITING USE OF GROUND PRESSURIZATION ELECTRIC PUMPS.

D. Procedure

(1) Remove line connecting hydraulic tank to tank de-aerator safety valve.

(2) Install cap assembly AN929-4 on de-aerator valve union.

(3) Install cap assembly AN929-4 on union at base of hydraulic tank.

(4) Replenish hydraulic tank (Ref. 12-12-29).

NOTE: During fluid replenishment, bleeding must be carried out on cap assembly AN929-4 installed on union at base of tank.

(5) Pressurize hydraulic tank to 4.5 bar (65.2 psi).

(6) Allow nitrogen pressure in accumulator to drop.

(a) Remove accumulator charging valve cap.

(b) Connect a flexible plastic hose to valve union.

(c) Unscrew charging valve control nut one and a half turns.

(7) Make certain that accumulator pressure is zero.

(8) Pressurize associated hydraulic system (Ref. 29-11-00, 29-12-00, 29-21-00, Servicing).

(9) Check that accumulator contains no nitrogen.

(10) Stop hydraulic system pressurization.

(11) Tighten accumulator charging valve control nut.

(12) Remove flexible hose and install and tighten valve cap.

PRINTED IN ENGLAND

(13) Clean working area and make certain that no trace of hydraulic fluid remains.

(14) Make certain that there is no leakage from cap assembly AN929-4 located at base of tank.

(15) Remove warning notices.

(16) Re-set circuit breaker M626.

E. Close-Up

(1) Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(2) Close access doors.

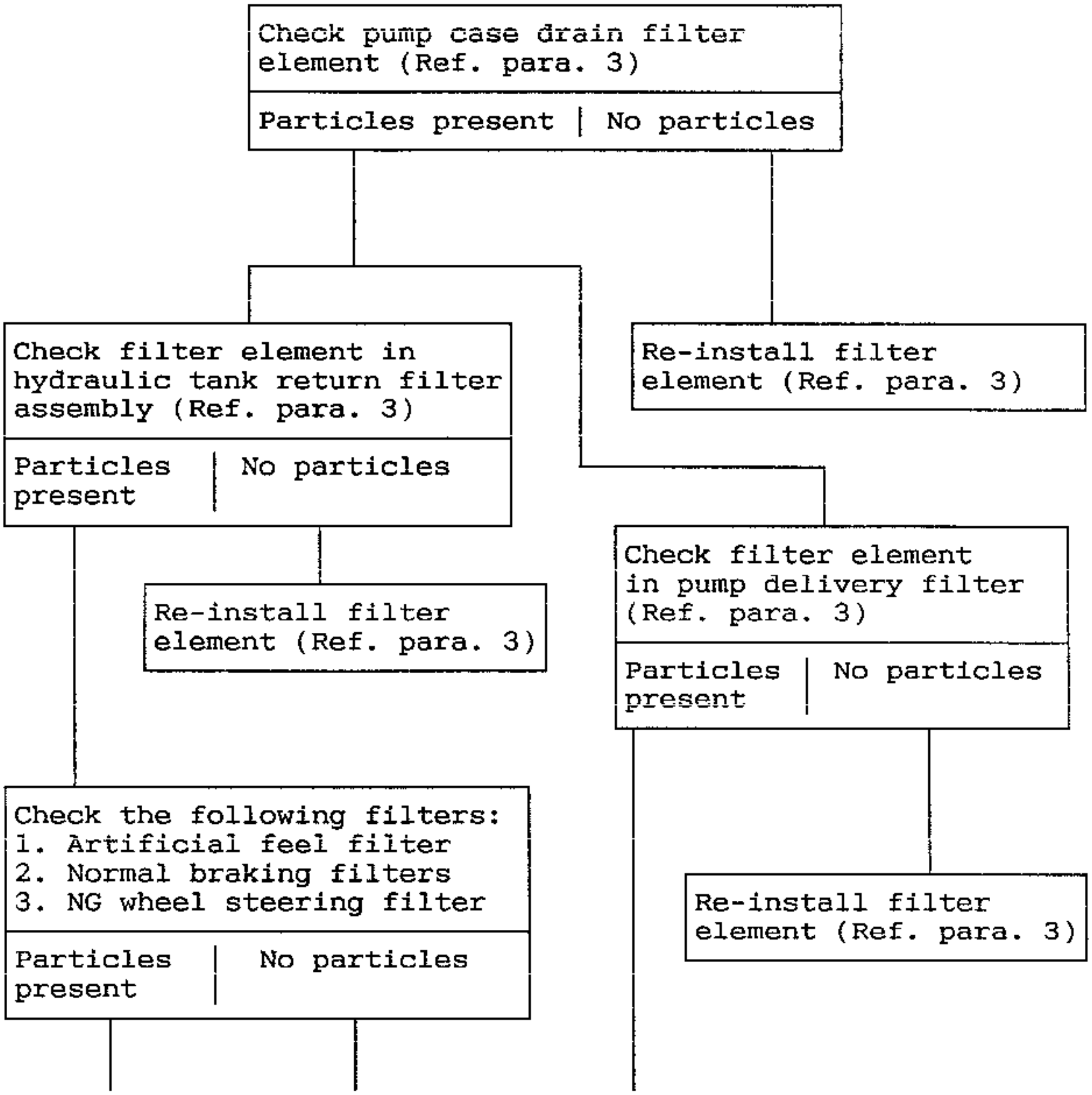
(3) Remove access platforms.

PRINTED IN ENGLAND

R 8. Procedure Following Contamination of Hydraulic System

This paragraph describes the procedure to be adopted following contamination of the hydraulic systems, in particular after failure of hydraulic system components.

A. Inspection of Case Drain Filters



PRINTED IN ENGLAND

Replace filter elements in filters concerned (Ref. para. 3)

Flush case drain line between pump and tank return filter.
Flush delivery line between filter and pump.
Replace filter elements in delivery, case drain and tank return filters (Ref. para. 3)

Take a sample of hydraulic fluid for testing.
If test result is not satisfactory -

Reclaim hydraulic fluid.

PRINTED IN ENGLAND

R 9. Hydraulic Fluid Reclaiming

A. If during sampling the contamination level of hydraulic fluid is found to exceed the authorized limit, it must be reduced to an acceptable norm by a reclaiming process.

B. Equipment and Materials

DESCRIPTION	PART NO.
Filling and filtering unit, hydraulic system	SDS742
Electrical ground power unit	-
Access platform 5 ft 11 in (1.8 m)	

C. Prepare

(1) Observe the safety precautions described in previous WARNING paragraph.

(2) Install access platforms.

(3) Open access door 151DB, and depressurize the hydraulic system concerned by means of the following valves:

Blue system : Pressure relief valve 3241
Green system : Pressure relief valve 3142
Yellow system : Pressure relief valve 3339

(4) Open corresponding engine panels (Ref. 71-00-00, Servicing):

Blue hydraulic system : panel 435AB
Green hydraulic system : panel 415AB
Yellow hydraulic system : panel 426AB

(5) Open access door 153BB, and make certain that fluid level in tank of system concerned is normal.

(6) Pressurize hydraulic tanks (Ref. 29-13-00, Servicing).

(7) Connect electrical ground power unit, and energize the aircraft electrical network (Ref. 24-41-00, Servicing).

PRINTED IN ENGLAND

PRINTED IN ENGLAND

(8) Make certain that the following circuit breakers are re-set:

SERVICE	PANEL	CIRCUIT BREAKER		MAP REF.
Blue Hydraulic System				
ENG 3 SHUT OFF VALVES CONT	4-213	W	4	D19
SHUT OFF VALVES IND	15-216	W	6	C19
Green Hydraulic System				
ENG 1 SHUT OFF VALVES CONT	2-213	W	3	F15
SHUT OFF VALVES IND	15-216	W	5	C18
Yellow Hydraulic System				
ENG 2 SHUT OFF VALVES CONT	2-213	W	7	B15
SHUT OFF VALVES IND	15-216	W	6	C19

(9) On Flight Engineer's HYDRAULIC MANAGEMENT panel, make certain that hydraulic shut-off valve magnetic indicator is in OPEN position.

(10) In the following zones:

Blue System : zone 435
Green System : zone 415
Yellow System : zone 426

Remove blanking plugs from hydraulic ground connectors, and connect line from hydraulic fluid filling and filtering unit.

D. Pressurization

(1) Start up hydraulic ground power unit and pressurize hydraulic system.

(2) Maintain system pressure flow by operating services, other than landing gear and visor, and in particular by operating brakes twenty times.

(3) Continue to reclaim hydraulic fluid until the contamination level is reduced to permitted norm.

E. Depressurization

(1) Shut down hydraulic ground power unit.

(2) In zone 151, depressurize appropriate hydraulic system.

(3) Disconnect filling and filtering unit.

(4) Install blanking plugs on hydraulic ground connectors.

F. Close-Up

(1) Close engine panels (Ref. 71-00-00, Servicing).

(2) Close access doors.

(3) De-energize the aircraft electrical network, and disconnect electrical ground power unit (Ref. 24-41-00, Servicing).

(4) Remove hydraulic fluid filling and filtering unit.

(5) Remove access platform.

PRINTED IN ENGLAND

GENERAL - REMOVAL/INSTALLATION

WARNING: MAKE CERTAIN THAT THE POSITIONS OF NOSE AND MAIN GEAR DOORS CORRESPOND WITH THE ACTUAL POSITIONS OF THE RESPECTIVE OPERATING HANDLES.
HANDLE LOCKED, INDICATOR PLATE SHOWING WHITE : DOORS CLOSED.
HANDLE LOCKED, INDICATOR PLATE SHOWING RED : DOORS OPEN.

MAKE CERTAIN THAT THE LANDING GEAR POSITION INDICATED ON THE GEARS POSITION INDICATING UNIT CORRESPONDS WITH THE ACTUAL POSITION OF THE LANDING GEAR.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE, MAKE CERTAIN THAT THE TRAVEL RANGES OF THE CONTROL SURFACES ARE CLEAR.

BEFORE PRESSURIZING HYDRAULIC SYSTEMS, CHECK THAT ALL CONTROLS ARE SET TO CORRESPOND WITH THE ACTUAL POSITION OF THE SERVICES THEY OPERATE.

MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

RB IF MORE THAN ONE HYDRAULIC PIPE IS DISCONNECTED IN THE
RB SAME AREA, A FULL FUNCTION CHECK OF THE DISTURBED
RB SYSTEM(S) MUST BE CARRIED OUT AFTER RECONNECTION.

1. Hydraulic Components Removal/Installation Procedure

General Removal/Installation procedure for components not requiring any special instructions, and consequently not dealt with separately in Chapter 29.

A. Equipment and Materials

DESCRIPTION	PART NO.
Access platform	-
Ground power unit - hydraulic power and preliminary testing	EMH398E

B. Prepare

(1) Open access door 153BB under fuselage and depressurize the relevant tank by opening associated depressurization valve.

(2) Depressurize relevant hydraulic system by actuating control lever of associated pressure relief and manual unloading valve. (The pressure relief valves are mounted on the Yellow/Green and Yellow/Blue manifolds located on the lower part of the fuselage, and accessible through door 151DB).

PRINTED IN ENGLAND

(3) Close tank depressurization valve, and secure with a safety pin.

C. Remove

Remove defective component.

D. Install

(1) Install replacement component.

(2) Replenish hydraulic tank as required (Ref. 12-12-29).

(3) Make certain that the area surrounding removed component has been thoroughly cleaned, and all traces of fluid removed.

(4) Whenever pump suction lines are removed, ruptured, or are faulty, the lines must be bled as per 29-11-00, Servicing (Green System), 29-12-00, Servicing (Blue) System), 29-21-00, Servicing (Yellow System).

E. Test

Carefully check hydraulic lines attached to component for external leakage, when relevant system is pressurized.

F. Close-Up

(1) Close access doors.

(2) Remove access platforms.

2. Minor Components, Removal/Installation

WARNING: OBSERVE THE ELECTRICAL SAFETY PRECAUTIONS DESCRIBED IN 24-00-00.

Standard removal/installation procedure for all minor components not dealt with separately in this chapter. Certain components located on the flight compartment panels require removal of associated electro luminescent panel (Chapter 33). These panels are electrically connected by flying leads or terminal connections at the back of the panel.

PRINTED IN ENGLAND

3. Caption Light Modules

A. Prepare

(1) De-energize the aircraft electrical network and disconnect electrical ground power unit (Ref. 24-41-00, Servicing).

(2) Trip, safety and tag circuit breaker corresponding to caption light to be removed, listed by electrical identifier:

PRINTED IN ENGLAND

R ON A/C 001-006 (Ref. Fig. 401 and 402)
R ON A/C 007-007 (Ref. Fig. 401A and 402)

IDENTIFIER	CORRESPONDING CIRCUIT BREAKER			
	CIRCUIT BREAKER	SERVICE	PANEL	MAP REF
M291	M272	ENG2 GRN PUMP CONT IND	15-215	D 7
M292	M271	ENG1 GRN PUMP CONT IND	15-215	D 6
M324	M311	ENG2 YELL PUMP CONT IND	15-215	B 8
M325	M312	ENG4 YELL PUMP CONT IND	15-215	B 9
M363	M342	ENG3 BLUE PUMP CONT IND	15-215	E 7
M364	M343	ENG4 BLUE PUMP CONT IND	15-215	E 8
G264	G261	YELL LL LP O/HEAT IND	15-215	C 9
G267	G261			
G270	G261			
G265	G262	BLUE LL LP O/HEAT IND	15-216	D19
G268	G262			
G271	G262			
G266	G263	GRN LL LP O/HEAT IND	15-216	D20
G269	G263			
G272	G263			
M765	M761	RAT TEST & No.1 CART SUP	1-213	R17
M766	M762	RAT IND & No.2 CART SUP	3-213	B10

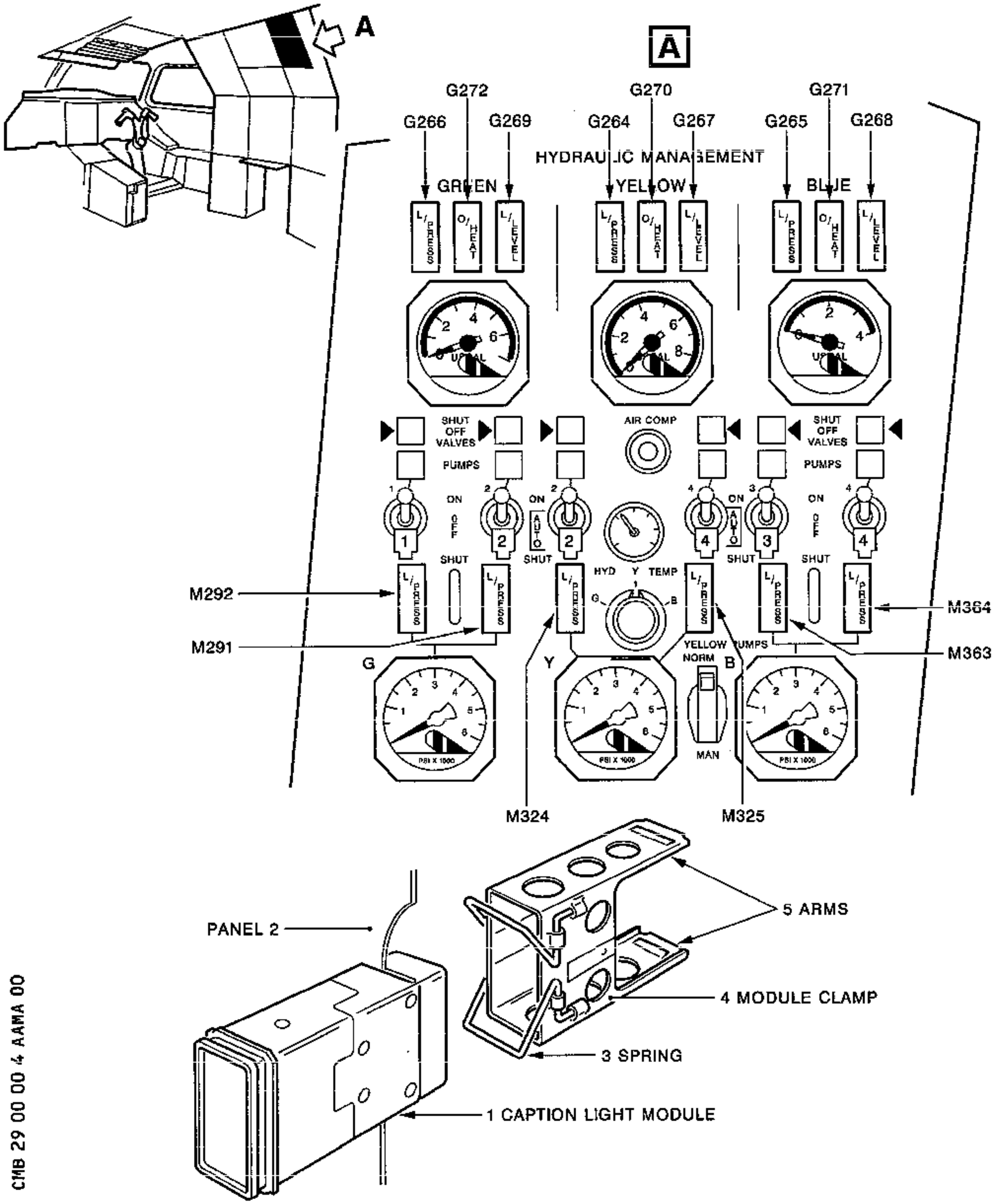
(3) Loosen rapid fasteners and open access panel.

B. Remove

(1) Remove cable ties as necessary to provide easy access to terminals.

(2) Disconnect cables from terminals. Use a special insertion/extraction tool on caption lights fitted with socket type terminals.

(3) Simultaneously hold apart two arms (5) on module clamp (4), holding caption light until, by pressing it from

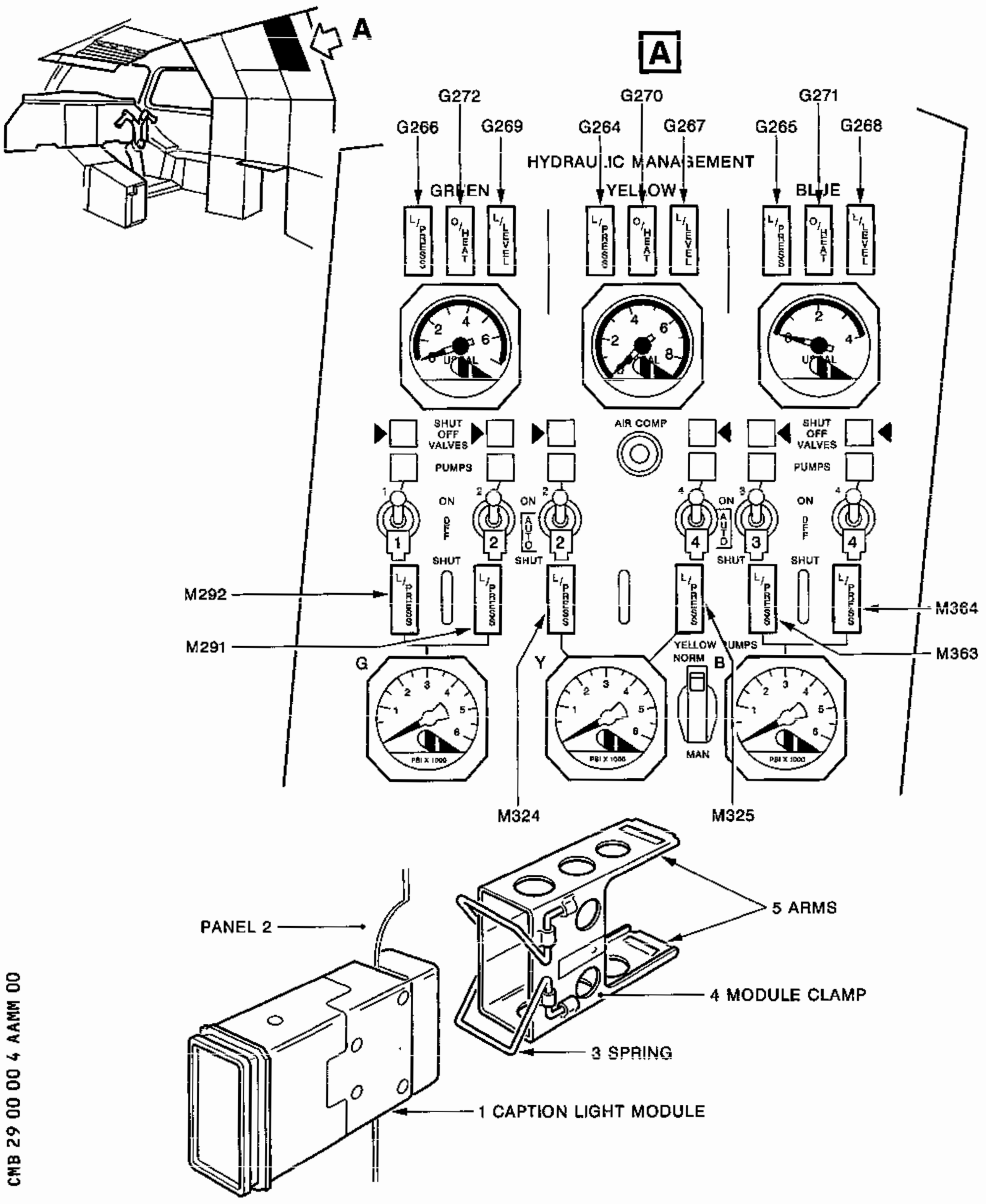


PRINTED IN ENGLAND

CMB 29 00 00 4 AAMA 00

R Removal of Caption Light Module on Hydraulic Management Panel
Figure 401

PRINTED IN ENGLAND

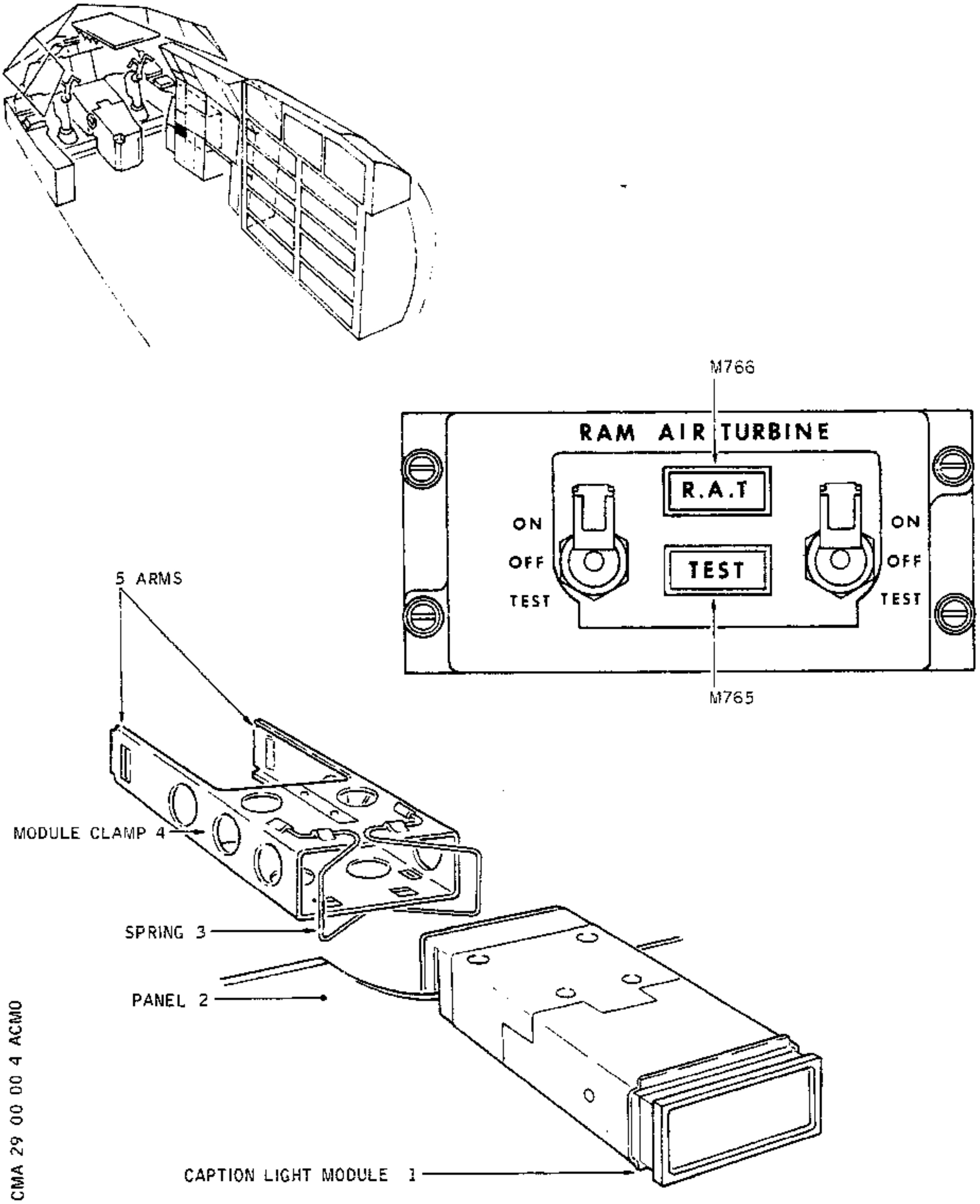


CMB 29 00 00 4 AAMM 00

Removal of Caption Light Module on Hydraulic Management Panel
Figure 401A

INTENTIONALLY BLANK

PRINTED IN ENGLAND



Removal of Caption Light Module
on RAT Control Panel
Figure 402

the rear it disengages from locking lugs.

C. Install

(1) Observe electrical safety precautions.

(2) Position module clamp (4) on rear of panel (2). Insert caption light module in its housing.

(3) Holding light module at front of panel, press home module clamp until locking lugs engage in light module recesses.

(4) Connect cables to caption light. Use the appropriate insertion/extraction tool on caption lights equipped with socket type terminals. Make certain that connections are made in conformity with electrical cable identifiers and associated wiring diagrams.

(5) Install cable ties as necessary.

(6) Close and secure panel with fasteners. Make certain that no electrical cables or looms are caught or damaged when closing panel.

D. Test

Cancel the electrical safety precautions and check correct operation of caption light by carrying out the appropriate test procedure.

4. Indicators

A. Prepare

(1) De-energize the aircraft electrical network and disconnect electrical ground power unit (Ref. 24-41-00, Servicing).

(2) Trip, safety and tag circuit breaker corresponding to indicator to be removed, listed by electrical identifier:

IDENTIFIER	CORRESPONDING CIRCUIT BREAKER			
	CIRCUIT BREAKER	SERVICE	PANEL	MAP REF
1D 22	1D 21	GRN SYS PRESS IND	2-213	C15
2D 22	2D 21	YELL SYS PRESS IND	4-213	E10
3D 22	3D 21	BLUE SYS PRESS IND	2-213	D15
D 44	D 41	GRN TANK CONTENTS IND	13-215	E 8
D 45	D 42	YELL TANK CONTENTS IND	13-216	B12
D 46	D 43	BLUE TANK CONTENTS IND	13-215	F 8

B. Remove
R ON A/C 001-006 (Ref. Fig. 403)
R ON A/C 007-007 (Ref. Fig. 403A)

(1) Release rapid fasteners and open panel.

(2) Disconnect electrical connector (2).

(3) Loosen indicator attachment screws (1).

(4) Remove indicator from front of panel.

C. Install

(1) Observe electrical safety precautions.

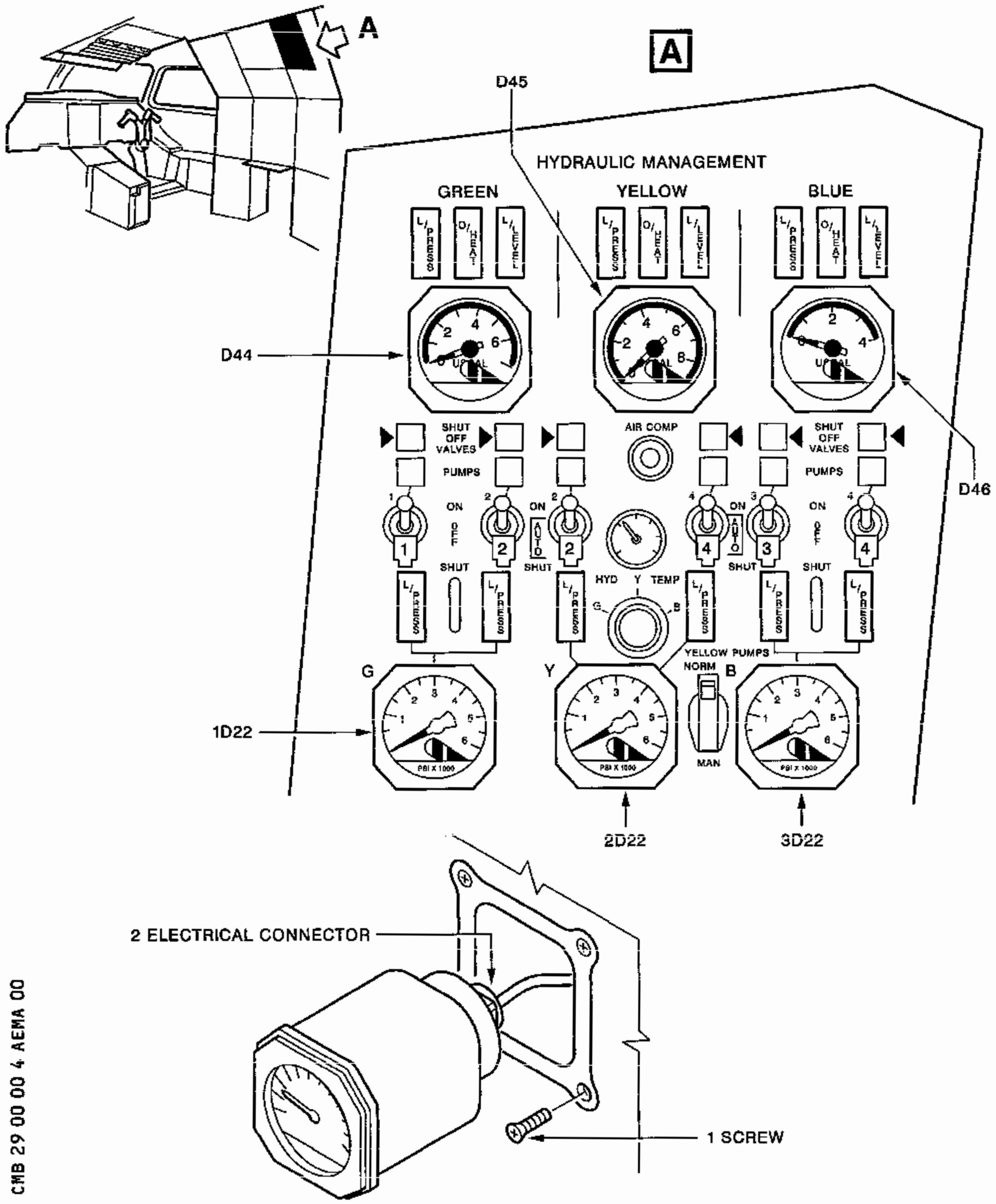
(2) Connect electrical connector to indicator.

(3) Position indicator on panel.

(4) Tighten indicator attachment screws.

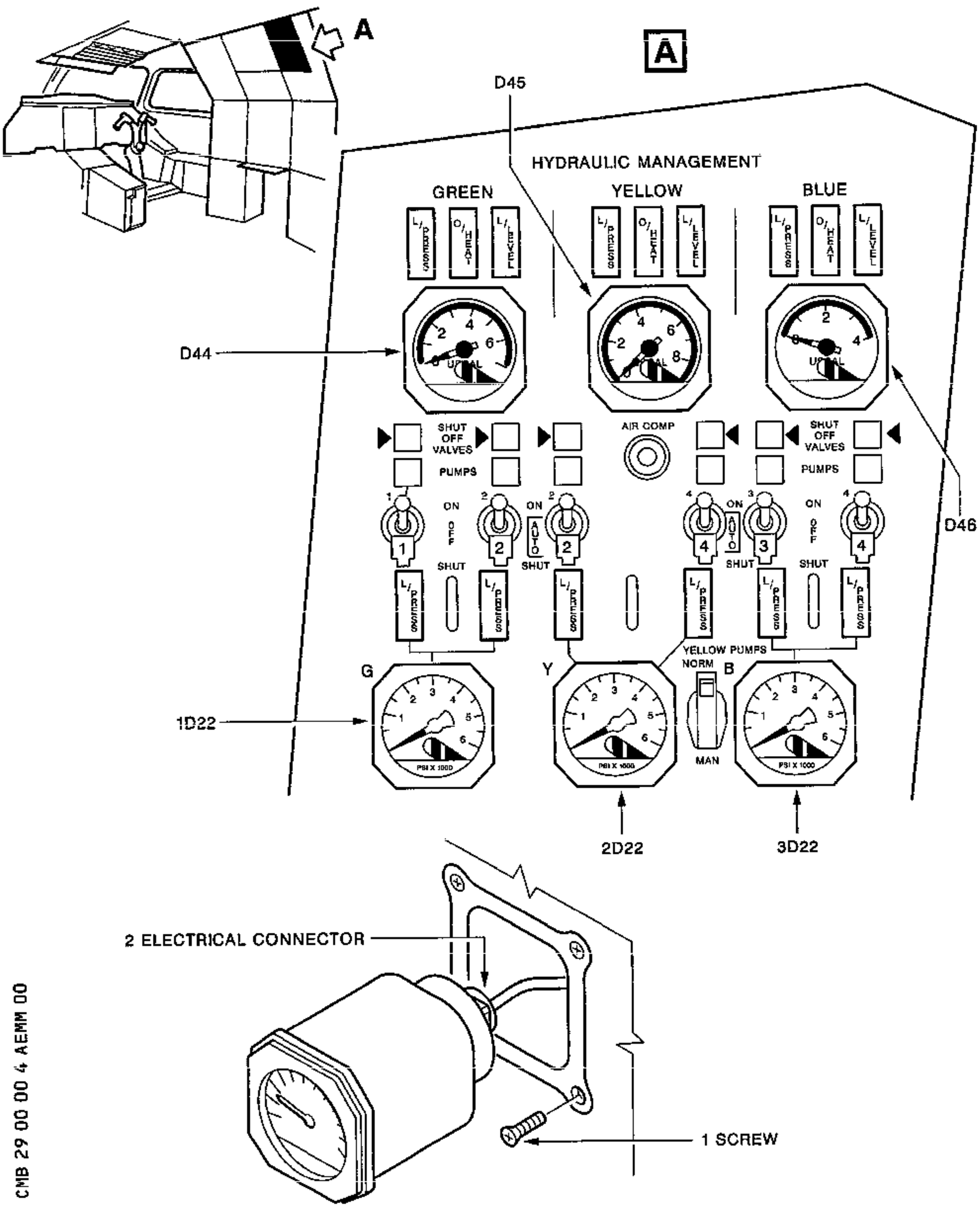
D. Test

Cancel electrical safety precautions and check correct operation of indicator by carrying out appropriate test procedure.



PRINTED IN ENGLAND

R Removal of Indicator from Hydraulic Panel
Figure 403



CMB 29 00 00 4 AEMM 00

Removal of Indicator from Hydraulic Panel
Figure 403A

R

5. Magnetic Indicators

A. Prepare

(1) De-energize the aircraft electrical network and disconnect electrical ground power unit (Ref. 24-41-00, Servicing).

(2) Trip, safety and tag circuit breaker corresponding to magnetic indicator to be removed, listed by electrical identifier:

R ON A/C 001-006 (Ref. Fig. 404)
R ON A/C 007-007 (Ref. Fig. 404A)

IDENTIFIER	CORRESPONDING CIRCUIT BREAKER			
	CIRCUIT BREAKER	SERVICE	PANEL	MAP REF
W 16	W 6	SHUT OFF VALVES IND	15-216	C19
W 14	W 6			
W 12	W 6			
W 11	W 5	SHUT OFF VALVES IND	15-216	C18
W 13	W 5			
W 15	W 5			
M289	M271	ENG1 GRN PUMP CONT IND	15-215	D 6
M288	M272	ENG2 GRN PUMP CONT IND	15-215	D 7
M323	M312	ENG4 YELL PUMP CONT IND	15-215	B 9
M322	M311	ENG2 YELL PUMP CONT IND	15-215	B 8
M361	M343	ENG4 BLUE PUMP CONT IND	15-215	E 8
M360	M342	ENG3 BLUE PUMP CONT IND	15-215	E 7

(3) Loosen rapid fasteners and open panel.

B. Remove

(1) Remove cable ties as necessary, to obtain easy access to terminals.

(2) Disconnect cables from connectors. On magnetic indicators equipped with socket type terminals use a special insertion/extraction tool.

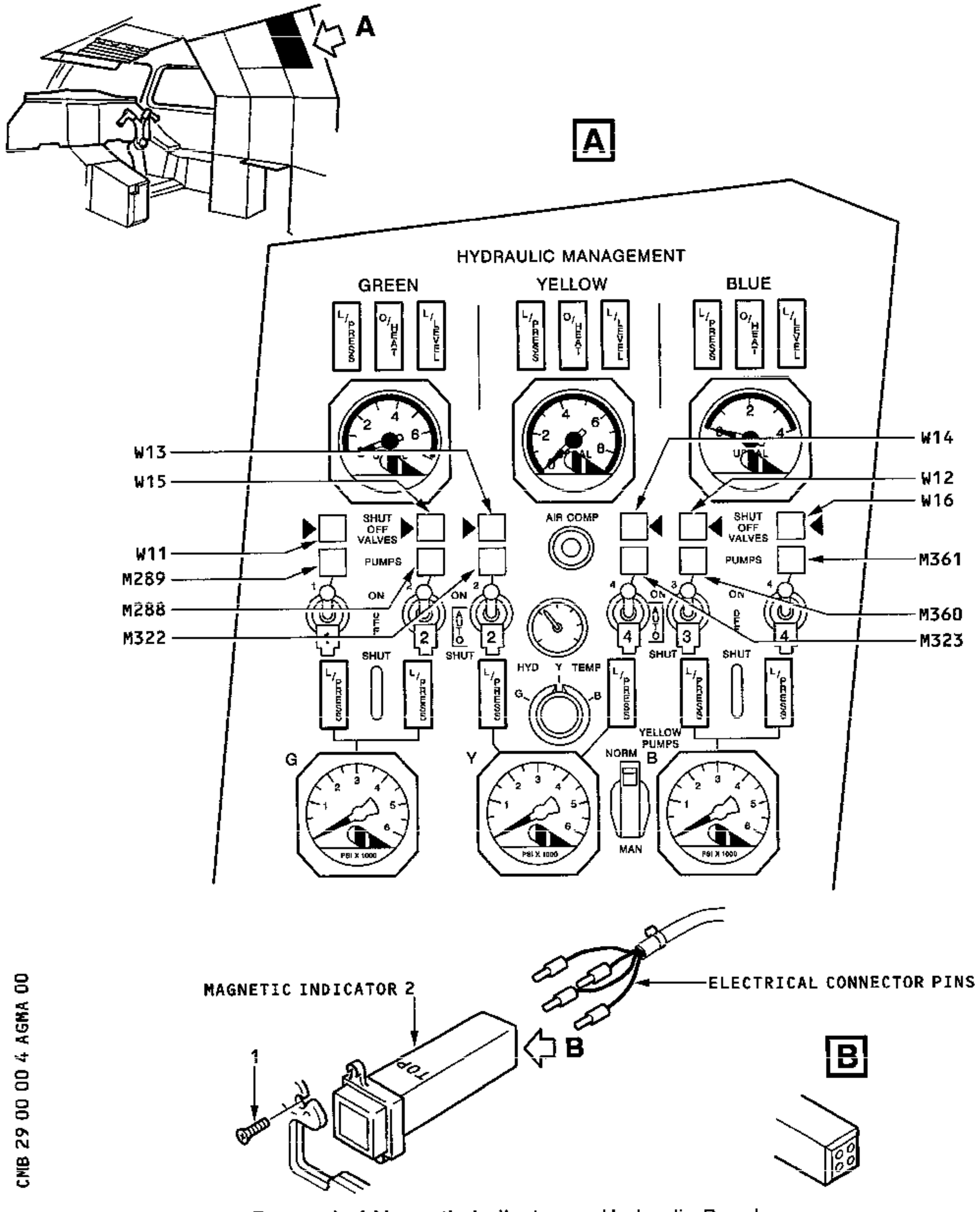
(3) Loosen attachment screws (1), remove magnetic indicators (2) through rear of panel.

C. Install

(1) Observe electrical safety precautions.

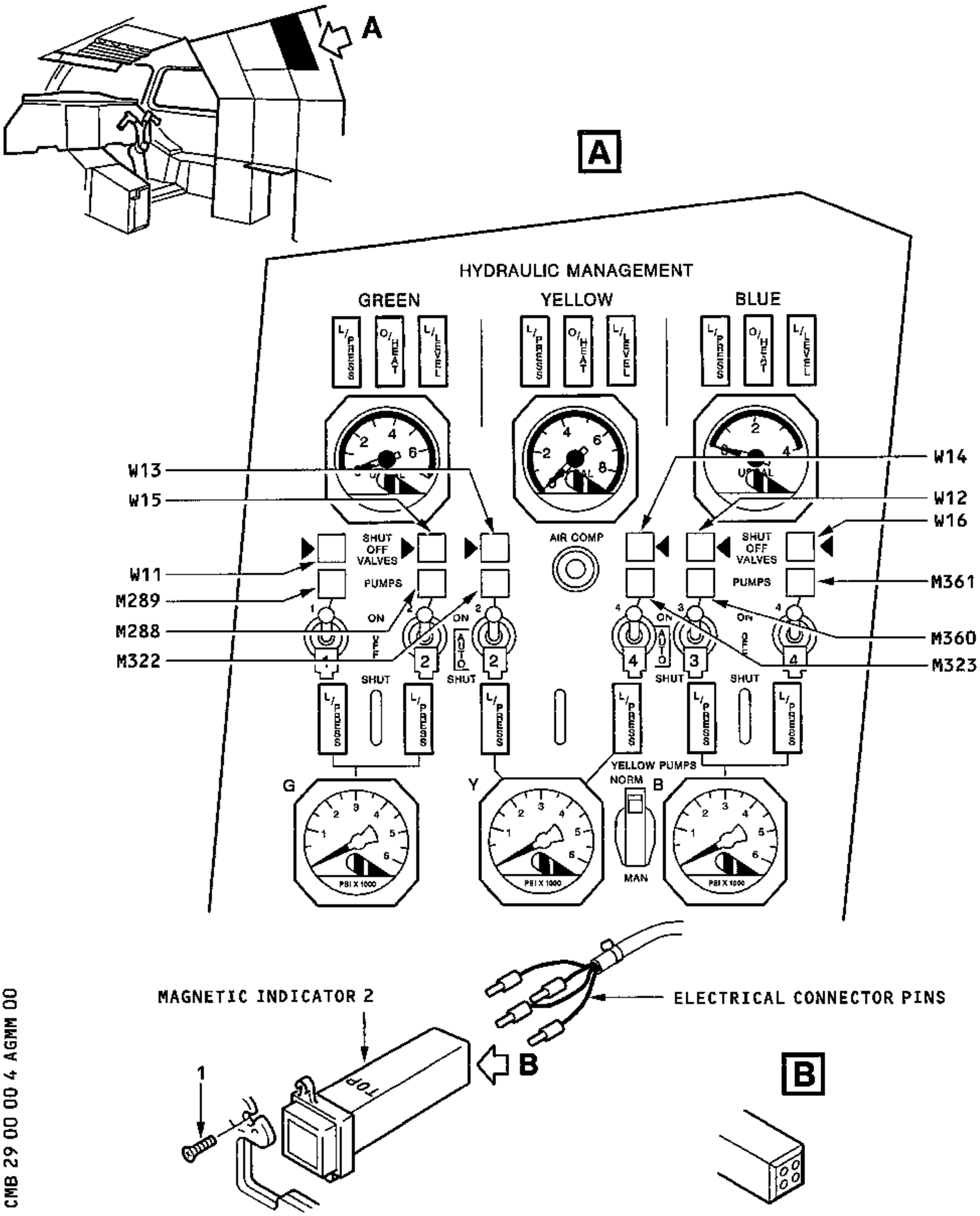
PRINTED IN ENGLAND

PRINTED IN ENGLAND



Removal of Magnetic Indicator on Hydraulic Panel
Figure 404

R



Removal of Magnetic Indicator on Hydraulic Panel
Figure 404A

(2) Install magnetic indicator (2), tighten attachment screws (1).

(3) Connect electrical cables to indicator, using a special insertion/extraction tool on magnetic indicators equipped with socket type terminals. Make certain that connections are made in conformity with electrical cable identifiers and associated wiring diagrams.

(4) Replace cable ties if necessary.

(5) Close and secure panel with fasteners, making certain that no electrical cables or looms are caught or damaged when closing panel.

D. Test

Cancel electrical safety precautions and check correct operation of magnetic indicator by carrying out appropriate test procedure.

PRINTED IN ENGLAND

6. Switch

A. Prepare

(1) De-energize the aircraft electrical network and disconnect electrical ground power unit (Ref. 24-41-00, Servicing).

(2) Trip, safety and tag circuit breaker corresponding to switch to be removed, listed by electrical identifier:

IDENTIFIER	CORRESPONDING CIRCUIT BREAKER			
	CIRCUIT BREAKER	SERVICE	PANEL	MAP REF
M274	M272	ENG2 GRN PUMP CONT & IND	15-215	D 7
M275	M271	ENG1 GRN PUMP CONT & IND	15-215	D 6
M313	M311	ENG2 YELL PUMP CONT & IND	15-215	B 8
M314	M312	ENG4 YELL PUMP CONT & IND	15-215	B 9
M345	M342	ENG3 BLUE PUMP CONT & IND	15-215	E 7
M346	M343	ENG4 BLUE PUMP CONT & IND	15-215	E 8
M763	M761	RAT TEST & No.1 CART SUP	1-213	R17
M764	M762	RAT IND & No.2 CART SUP	3-213	B10
M329	M312	ENG4 YELL PUMP CONT & IND	15-215	B 9

(3) Loosen rapid fasteners and open panel.

B. Remove
ON A/C 001-006 (Ref. Fig. 405 and 406)
ON A/C 007-007 (Ref. Fig. 405A and 406)

NOTE: De-safety switch guards on RAT switches.

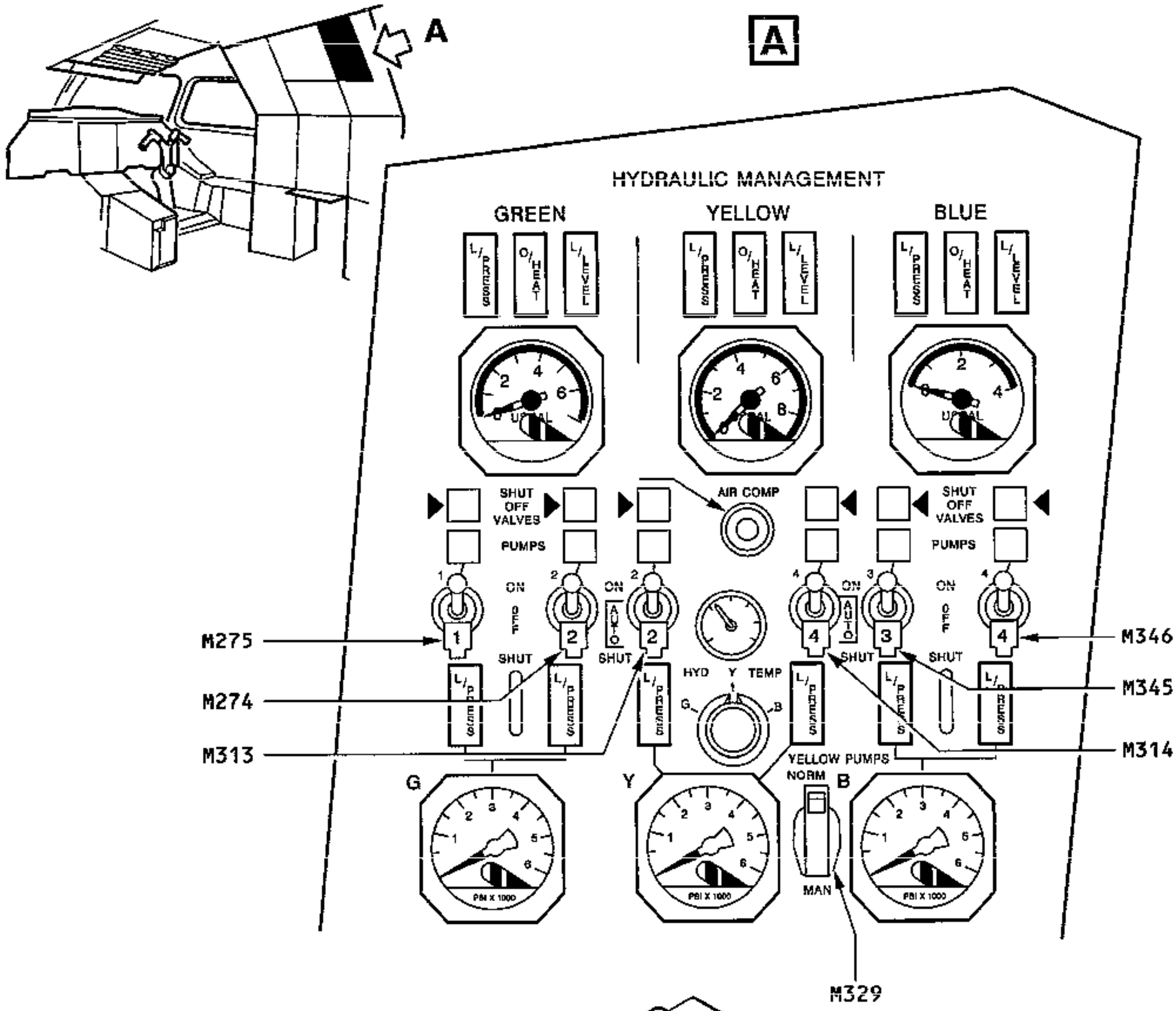
(1) Remove cable ties as necessary, to provide easy access to terminals.

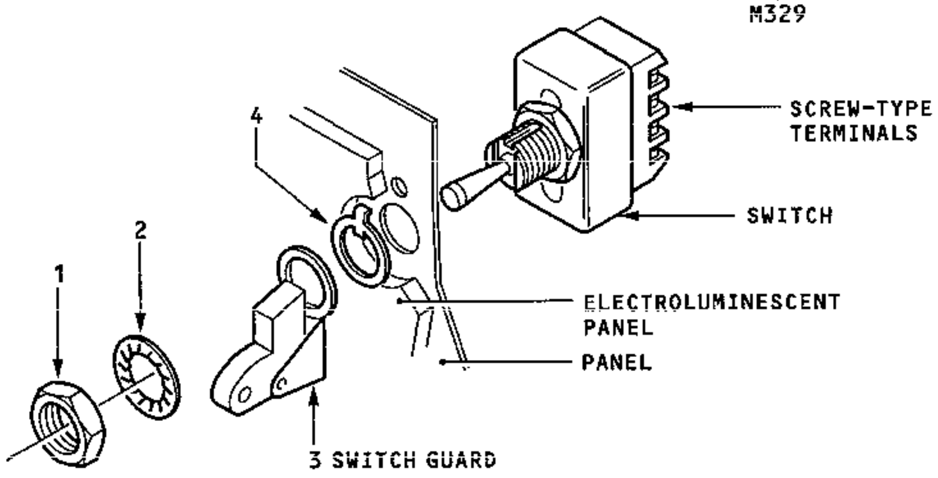
(2) Remove electrical cables from terminals. Use a special insertion/extraction tool on switches equipped with socket type terminals. Place switch guard in lower position.
Loosen and remove nut (1) securing switch to panel.

(3) Remove, lock washer (2) switch guard (3) and positioning washer (4).

(4) Remove switch.

PRINTED IN ENGLAND



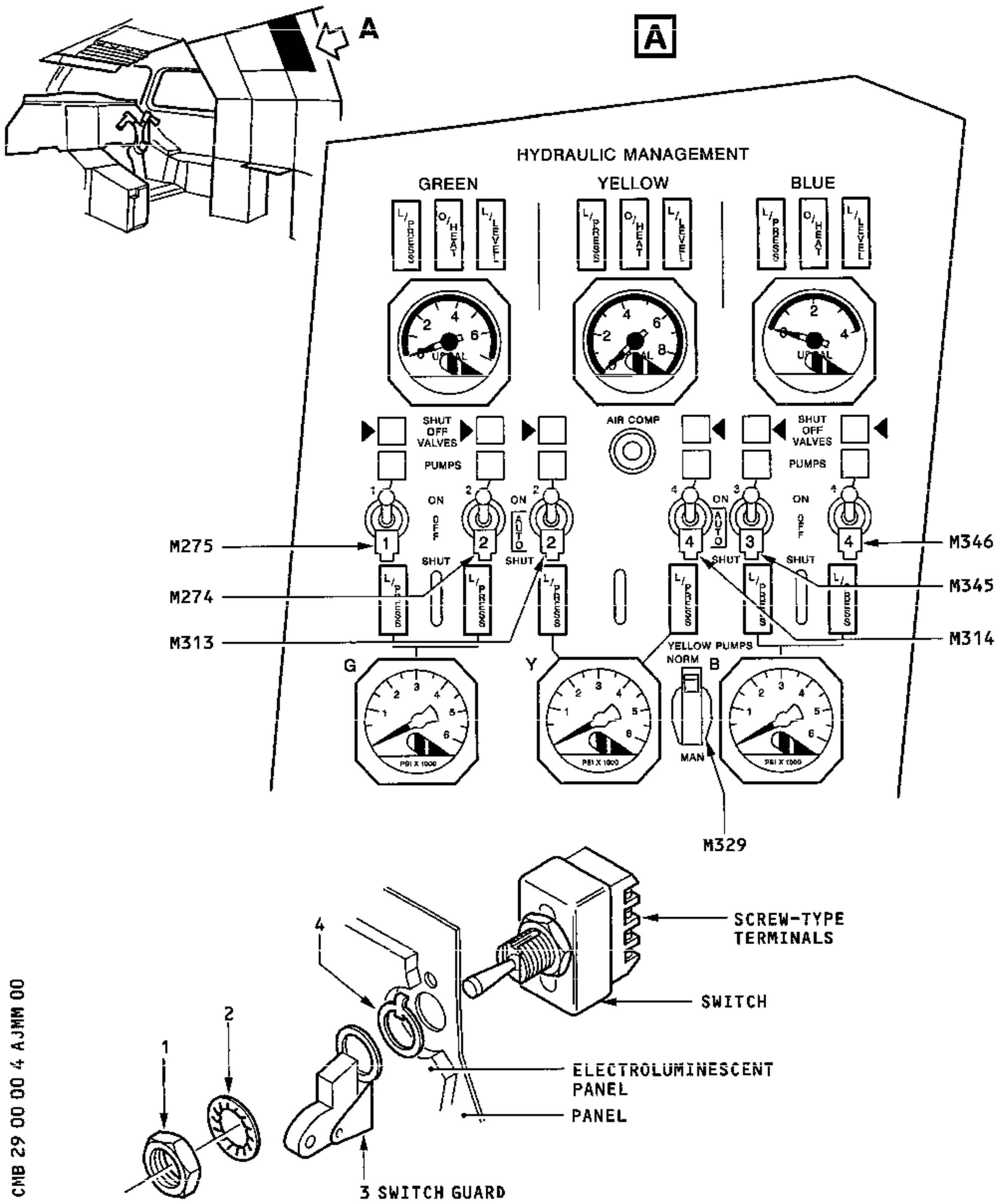


CMB 29 00 00 4 AJMA 00

PRINTED IN ENGLAND

Removal of Switch on Hydraulic Management Panel
Figure 405

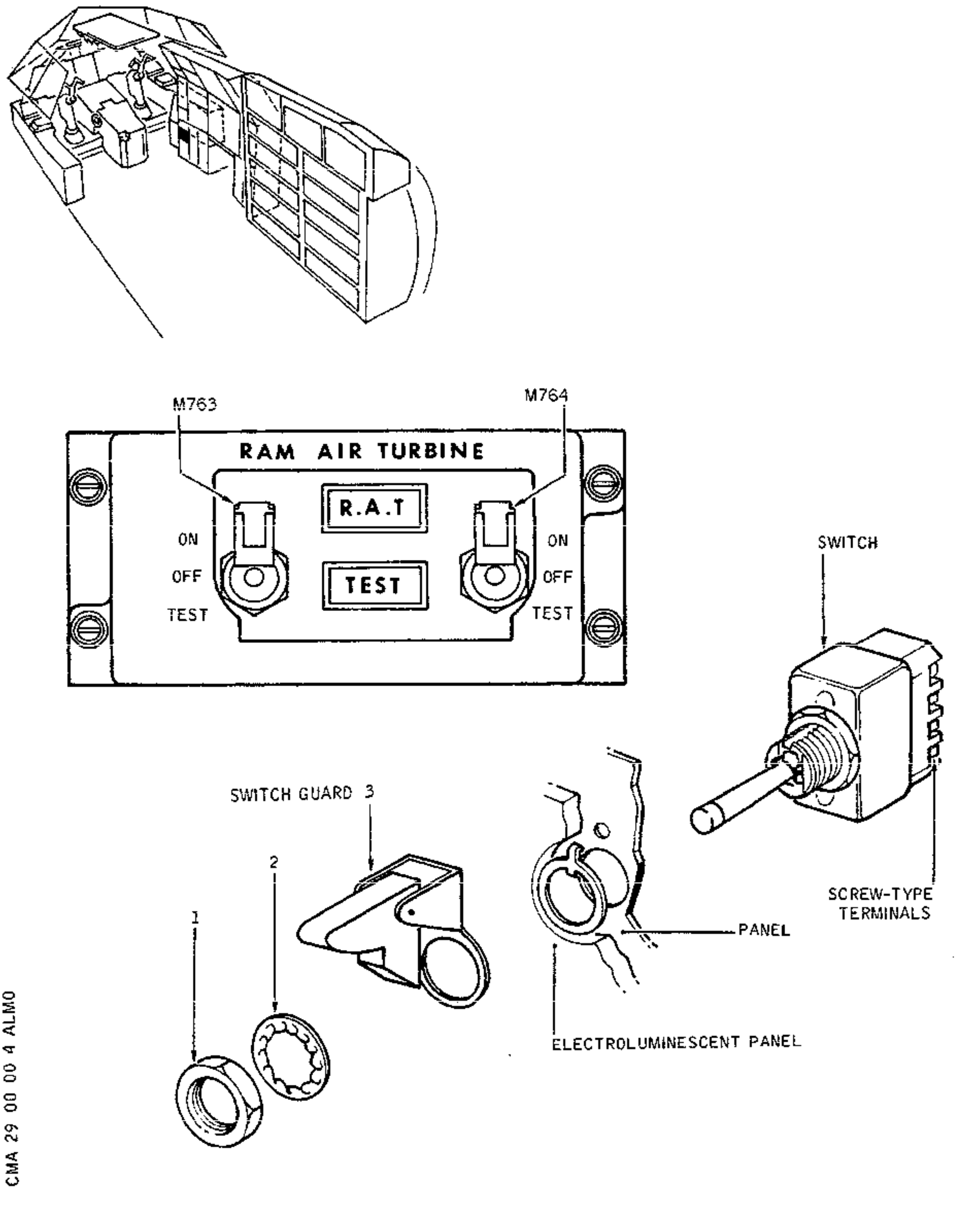
R



PRINTED IN ENGLAND

CMB 29 00 00 4 AJMM 00

Removal of Switch on Hydraulic Management Panel
R Figure 405A



Removal of Switch on RAM AIR TURBINE Control Panel
Figure 406

C. Install

(1) Observe electrical safety precautions

(2) Position switch in alignment with positioning washer

(3) Install positioning washer (4) and lock washer (2)

(4) Assemble and tighten securing nut (1)

(5) Connect electrical cables to switch. Use a special insertion/extraction tool on switches equipped with a socket type terminal.
Make certain that connections are made in conformity with electrical cable identifiers and associated wiring diagrams.

(6) Replace cable ties if necessary.

(7) Close and secure panel with rapid fastenerss, making certain that no electrical cables or looms become caught or damaged when closing panel.

NOTE : On RAT switches, safety switch guards with lead seal.

D. Test

Cancel electrical safety precautions, and check correct operation of switch by carrying out appropriate test procedure.

7. Electric Pump Control Panel

A. Prepare

(1) De-energize the aircraft electrical network and disconnect electrical ground power unit.

(2) Trip, safety and tag the following circuit breaker :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
HYD CHECK OUT SEL VALVE CONT	15-216	M 626	F22

(3) Loosen attachment screws, and open panel

B. Remove
(Ref. Fig. 407)

(1) Disconnect electrical connector

(2) Remove attachment screws (2) from control panel

(3) Remove electric pump control panel fron front of panel 8-214

C. Install

(1) Observe electrical safety precautions

(2) Install control panel

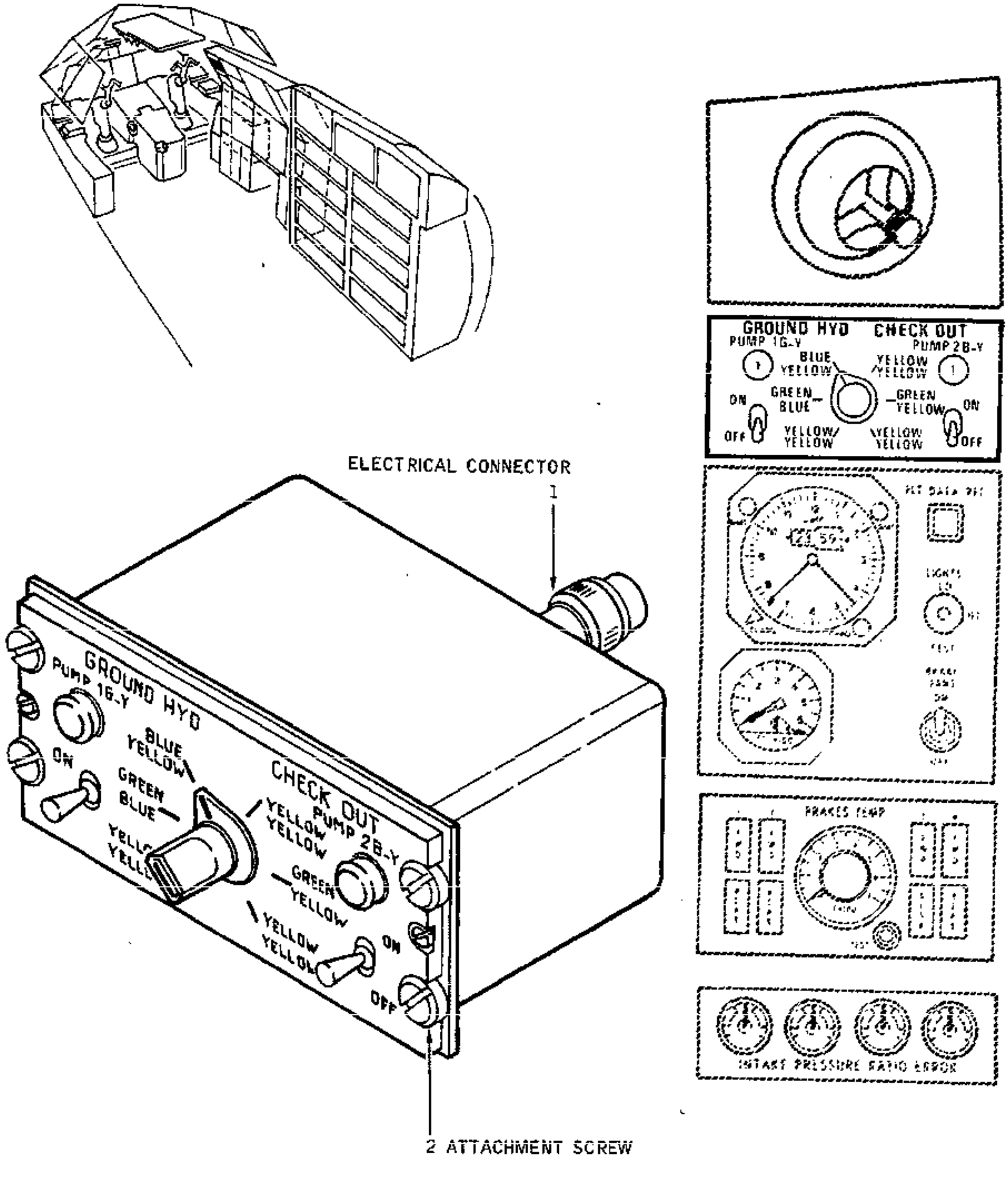
(3) Tighten attachment screws (2)

(4) Connect electrical connector (1)

(5) Close and secure panel, making certain that no electrical cables or looms are caught or damaged when closing panel

D. Test

Cancel electrical safety precautions and check correct operation of control panel by carrying out appropriate test procedure



CMA 29 00 00 4 ANMO

Electric Pump Control Panel
Figure 407

8. Push-Button - AIR COMP (Tank Air Compressor Control)

A. Prepare

(1) De-energize the aircraft electrical network, and disconnect electrical ground power unit (Ref. 24-41-00, Servicing).

(2) Trip, safety and tag the following circuit breaker:

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
HYD TANKS COMPR CONT	15-215	M602	D 8

(3) Loosen rapid fasteners and open the panel.

B. Remove
R ON A/C 001-006 (Ref. Fig. 408)
R ON A/C 007-007 (Ref. Fig. 408A)

(1) Remove electrical cable ties if necessary to obtain easy access to terminals.

(2) Disconnect cables from terminals, using a special insertion/extraction tool on push-buttons equipped with socket type terminals.

(3) Loosen securing nut (1), retain lock washer (2).

(4) Remove push-button.

C. Install

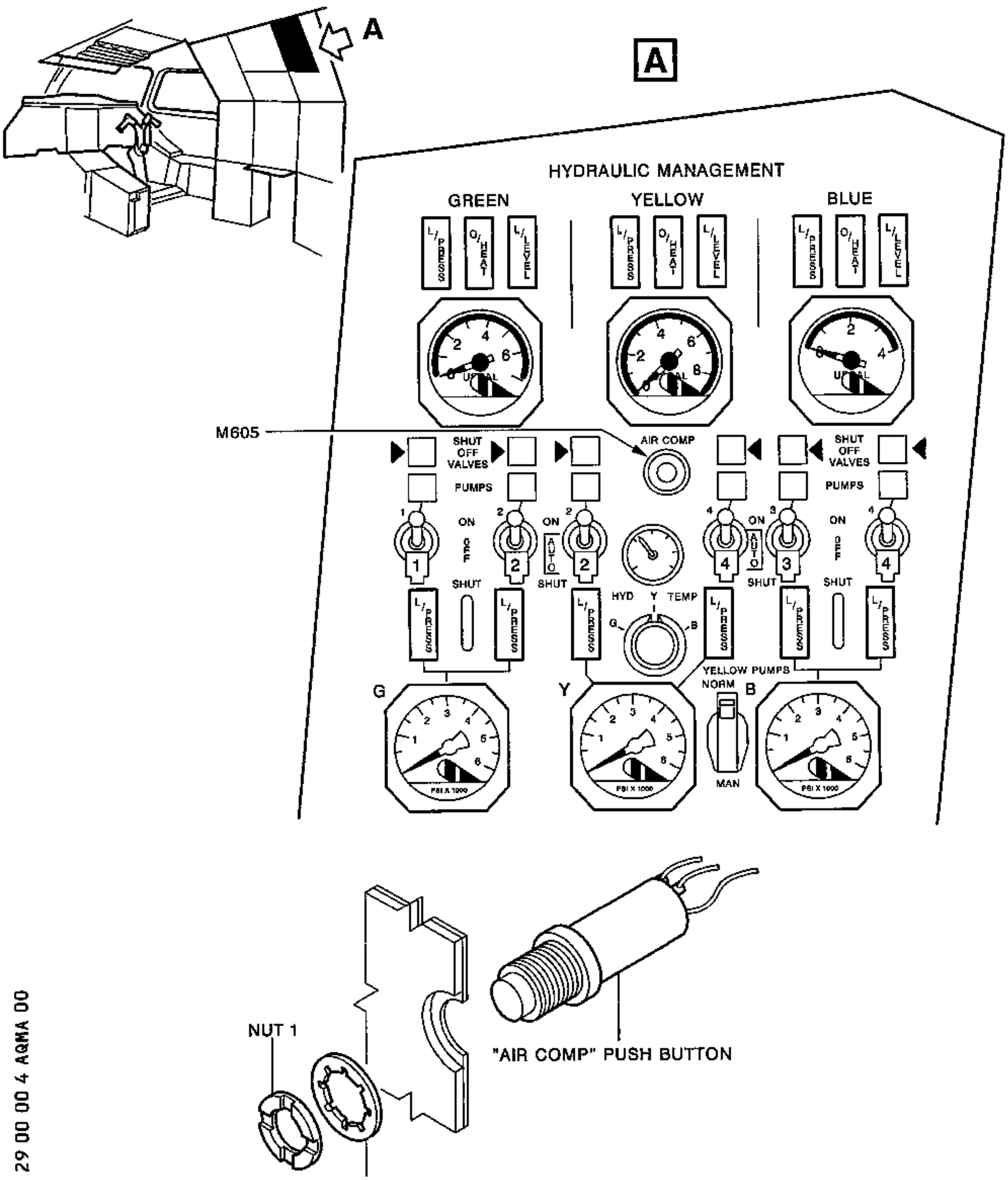
(1) Position push-button in its housing on the panel.

(2) Install lock washer (2), install and tighten securing nut (1).

(3) Connect electrical cables to push-button, making certain that connections are made in conformity with electrical identifiers and associated wiring diagrams.

D. Test

Cancel electrical safety precautions and check correct operation of push-button by carrying out appropriate test procedure.

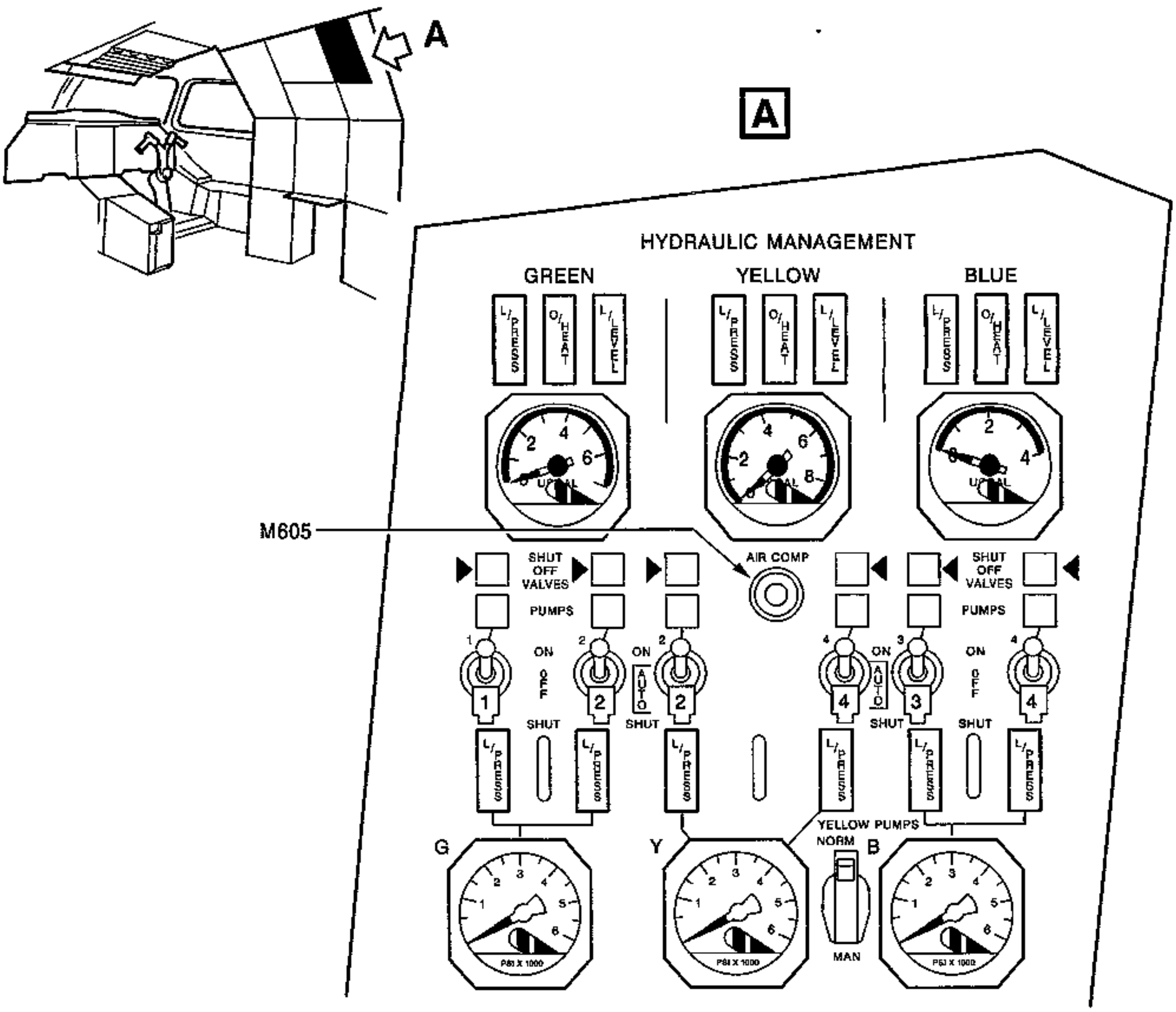


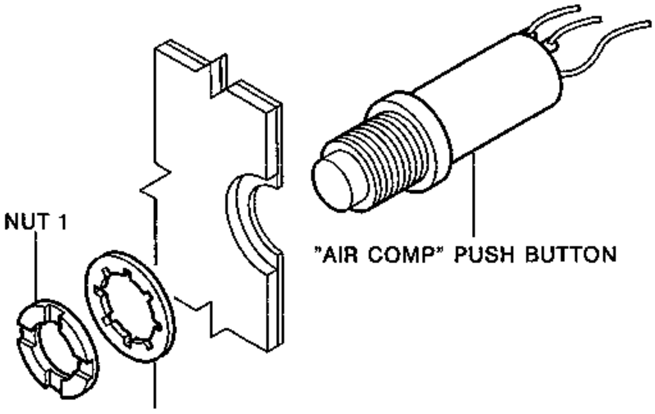
Push Button - AIR COMP
Figure 408

PRINTED IN ENGLAND

CMB 29 00 00 4 AQMA 00

PRINTED IN ENGLAND





CMB 29 00 00 4 AQMM 00

Push Button - AIR COMP
Figure 408A

PRINTED IN ENGLAND

INTENTIONALLY BLANK

9. Relays

A. Prepare

(1) De-energize the aircraft electrical network, and disconnect electrical ground power unit

(2) Open panels corresponding to relays to be removed :
(Ref. Fig. 409, 410 and 411)
(Ref. Fig. 412)

(3) Trip, safety and tag circuit breaker corresponding to relay to be removed, listed by electrical identifier :

IDENTIFIER	CORRESPONDING CIRCUIT BREAKER			
	CIRCUIT BREAKER	SERVICE	PANEL	MAP REF
M296	M272	ENG2 GRN PUMP CONT IND	15-215	D 7
M297	M 271	ENG1 GRN PUMP CONT IND	15-215	D 6
M316	M 311	ENG2 YELL PUMP CONT IND	15-215	B 8
M328	M 311			
M317	M 312	ENG4 YELL PUMP CONT IND	15-215	B 9
M327	M 312			
M350	M 341	YELL PUMPS AUTO ON LOAD CONT	15-215	E 6
M368	M 343	ENG4 BLUE PUMP CONT IND	15-215	E 8
M369	M 342	ENG3 BLUE PUMP CONT IND	15-215	E 7
M603	M 602	HYD TANK COMP CONT	15-215	D 8
M604	M 601	HYD TANK AIR COMP SUP	13-215	G 7
	M 602	HYD TANK COMP CONT	15-215	D 8
M608	M 601	HYD TANK AIR COMP SUP	13-215	G 7
M608	M 601	HYD TANK AIR COMP SUP	13-215	G 7
M630	H1893	No.4 MAIN AC BUS GALLEY SUP	22-216	
M631	H1896	No.1 MAIN AC BUS GALLEY SUP	22-215	

(3) Relay Location

RELAY	SERVICE	ZONE
M296	RELAY TEST, ENG2 GREEN HYD SYS PUMP DEPRESSURIZATION	2-123
M297	RELAY TEST, ENG 1 GREEN HYD SYS PUMP DEPRESSURIZATION	2-123
M316	RELAY MASTER WARNING, YELLOW HYD. SYS PUMP DEPRESSURIZATION (ENG2)	3-123

RELAY	SERVICE	ZONE
M328	RELAY	3-123
M317	RELAY MASTER WARNING, YELLOW HYD SYS PUMP DEPRESSURIZATION (ENG 4)	3-123
M327	RELAY	3-123
M350	RELAY ON LOADING STANDBY PUMPS YELLOW	3-123
M368	RELAY TEST, ENG4 BLUE HYD SYS PUMP DEPRESSURIZATION	3-123
M369	RELAY TEST, ENG3 BLUE HYD SYS PUMP DEPRESSURIZATION	3-123
M603	RELAY TIME DELAY, HYD TANK AIR COMPRESSOR	2-123
M604	RELAY CONTROL, HYD TANK AIR COMPRESSOR	2-123
M608	RELAY TANK AIR COMPRESSOR OVERHEAT SAFETY	7-243
M630	CONTACTOR BLUE/YELLOW HYD SYS ELECTRIC PUMP	166
M631	CONTACTOR GREEN YELLOW HYD SYS ELECTRIC PUMP	165

B. Remove
(Ref. Fig. 413)

(1) Loosen knurled nuts (5) and disengage hinged fasteners (4) from relay box.

(2) Remove cabling attached to top of box.

(3) Remove relay box from its mounting without disconnecting connectors located behind it.

(4) Loosen relay securing nuts (2), retain washers, and pull out relay.

C. Install

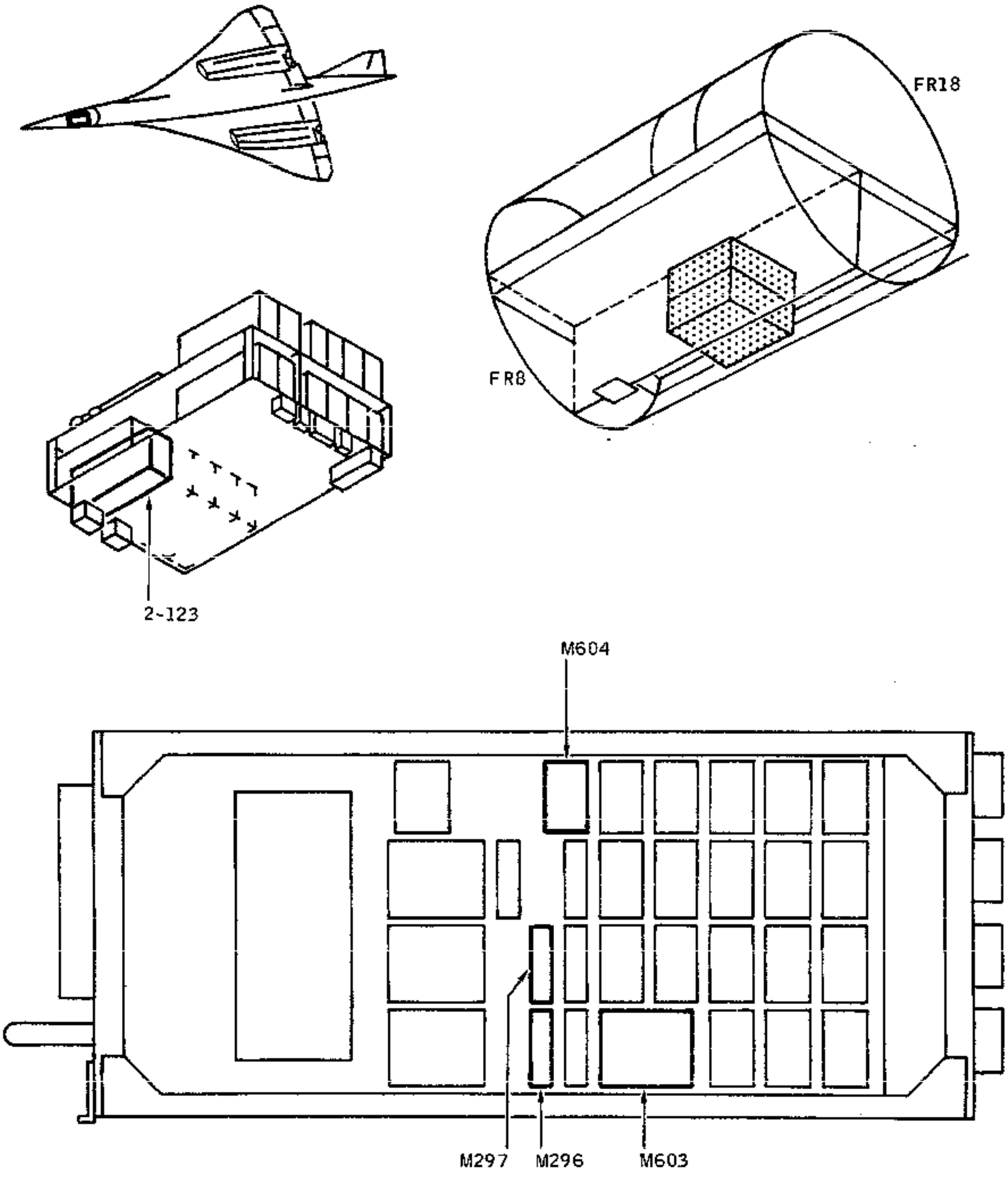
(1) Place relay in its housing, and secure with nut (2) and washer (1).

(2) Install relay box, and attach cabling to top of box.

(3) Install hinge fasteners (4) on relay box, and tighten knurled nut (5).

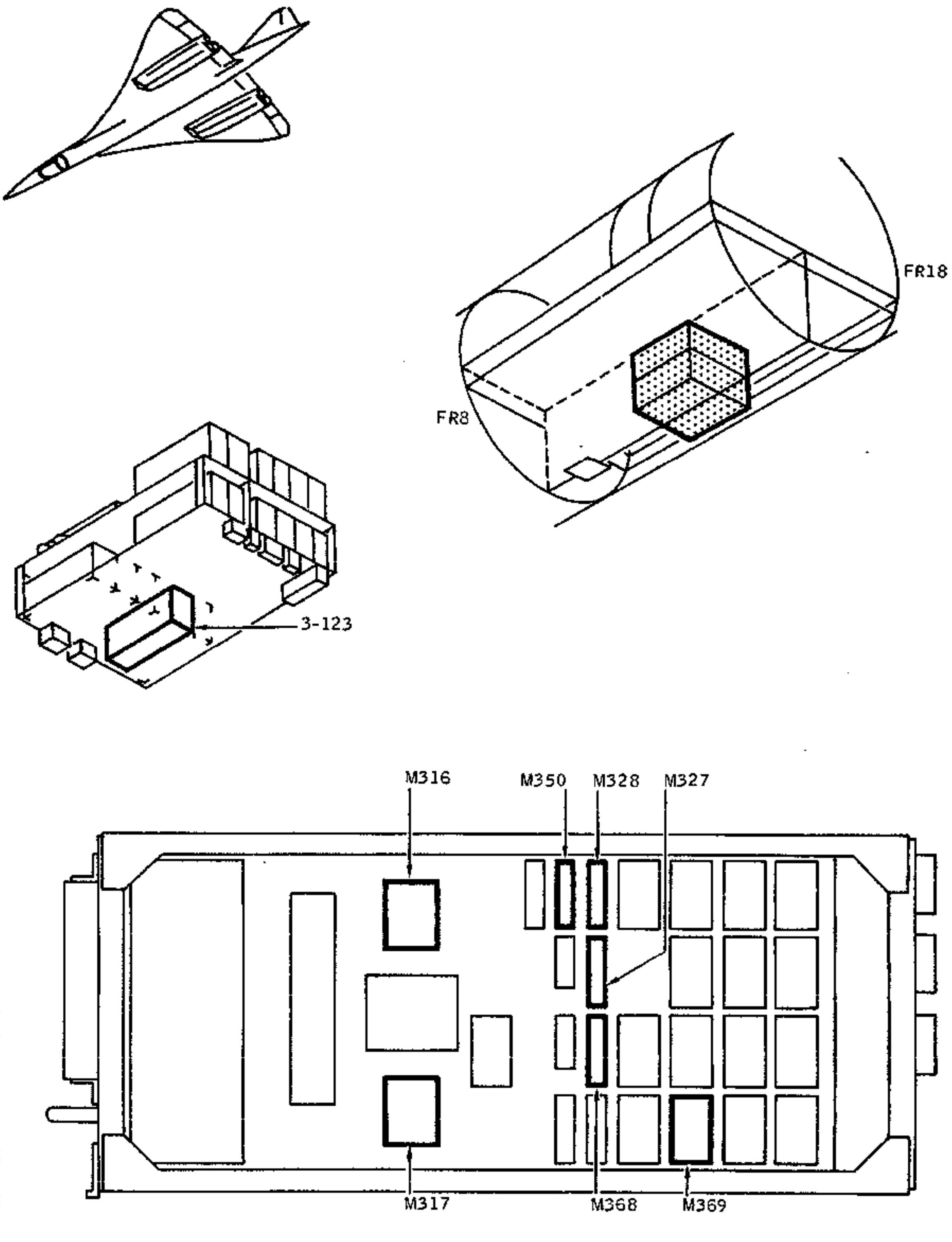
D. Test

Cancel electrical safety precautions and check correct operation of relay by carrying out appropriate test procedure.



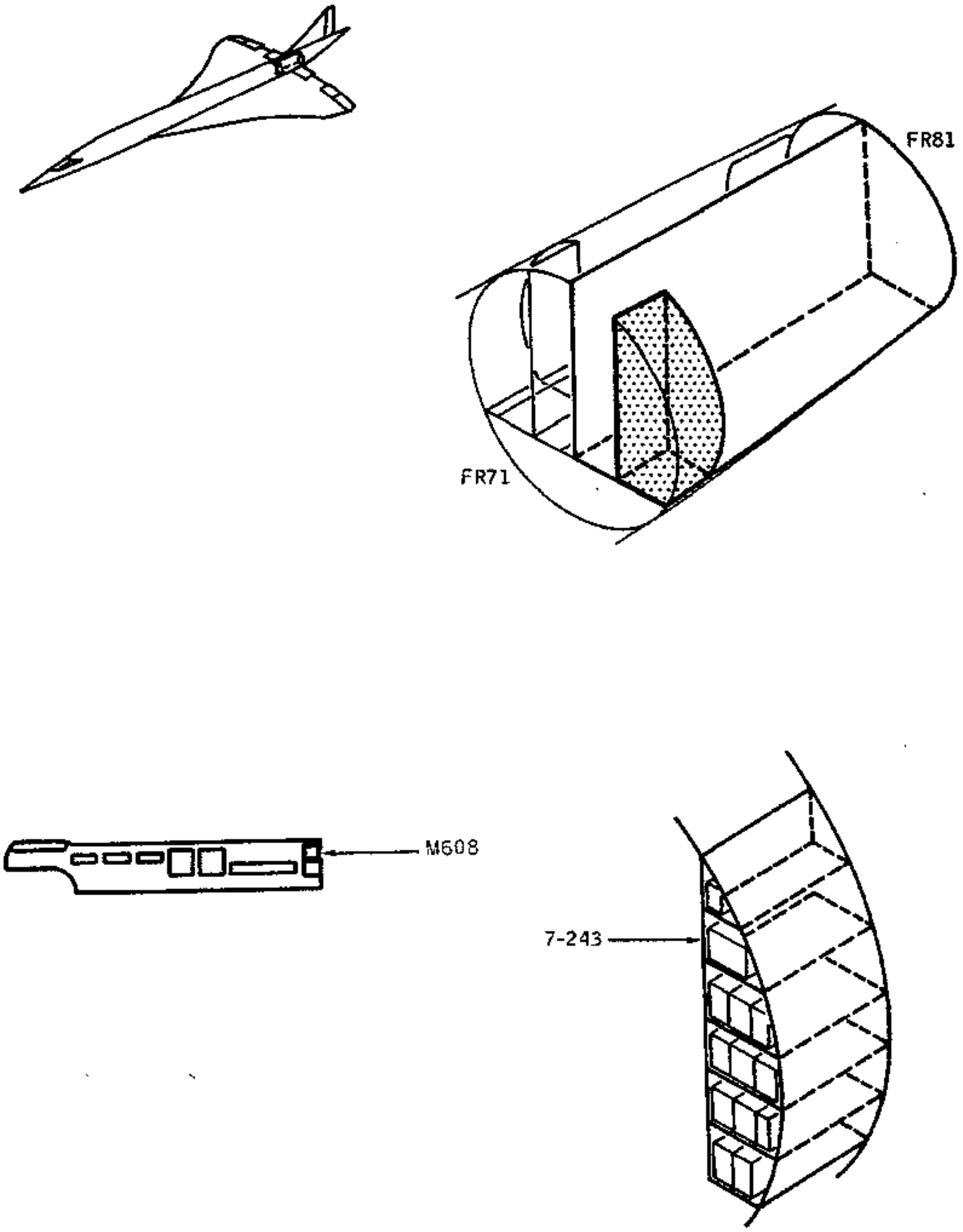
CMA 29 00 00 4 ASMO

Relay Box 2-123
Figure 409



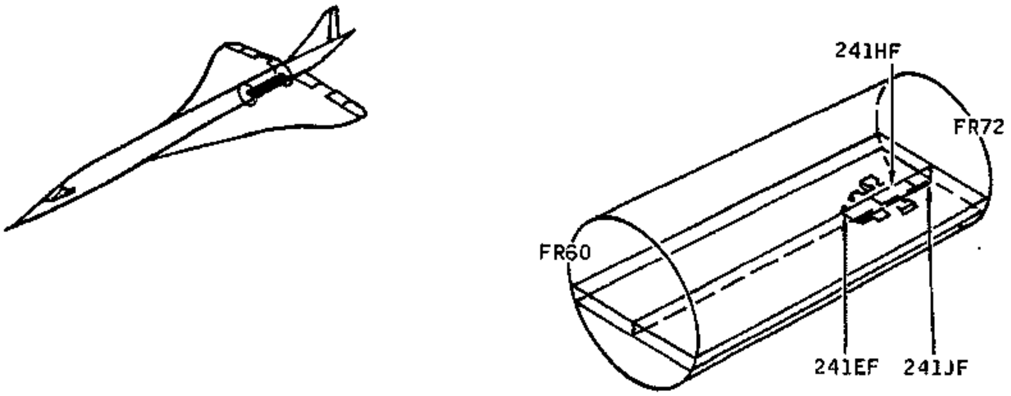
CMA 29 00 00 4 AUMO

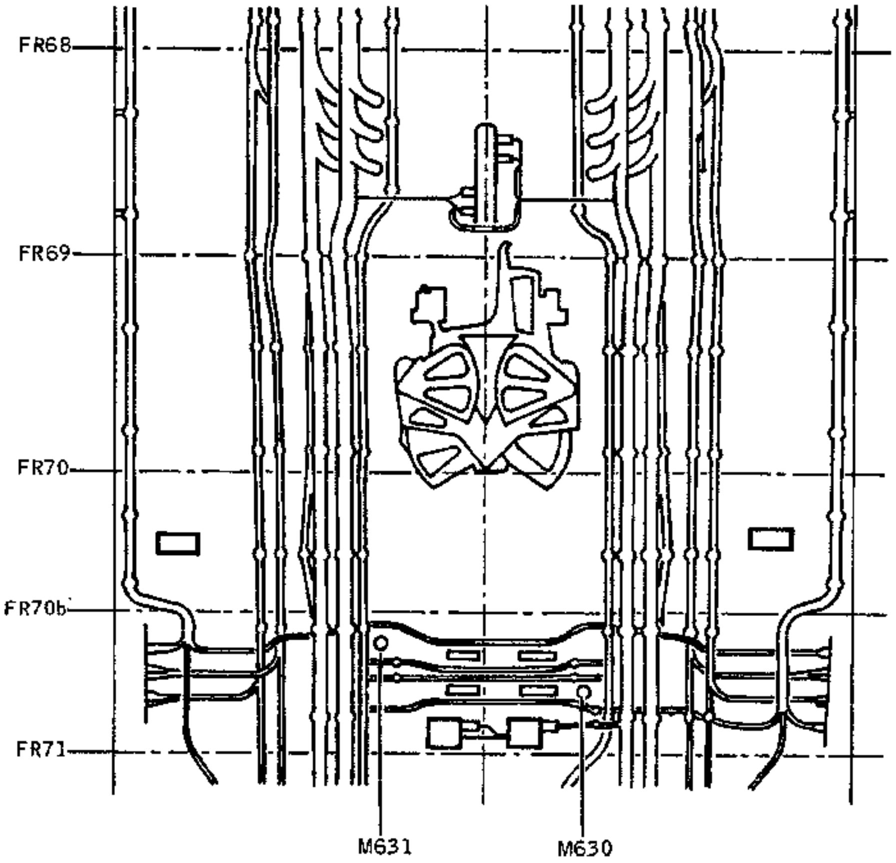
Relay Box 3-123
Figure 410



CMA 29 00 00 4 AWMO

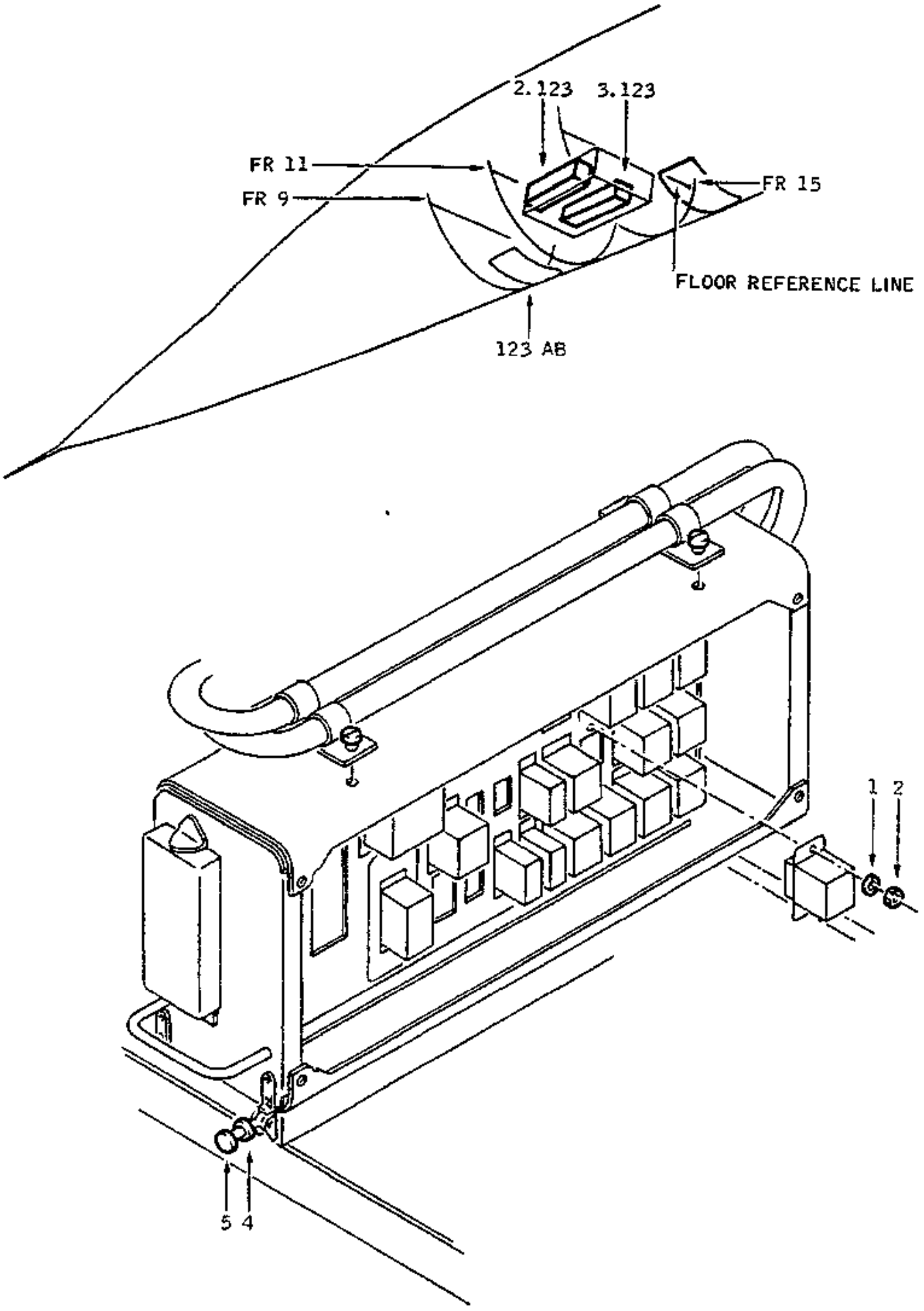
Relay Box 7-243
Figure 411





CMA 29 00 00 4 AYM0

Electric Pump Contactors
Figure 412



CMA 29 00 00 4 BAMO

Removal of Relay
Figure 413

E. Close-up

(1) Re-set circuit breakers

(2) Close access panels

Printed in England

PRINTED IN ENGLAND

10. Temperature Indicator
(Ref. Fig. 414)

A. Prepare

(1) De-energize the aircraft electrical network and disconnect electrical ground power unit (Ref. 24-41-00, Servicing).

(2) Trip, safety and tag the following circuit breaker:

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
HYD FLUID TEMP IND	15-215	D220	D 9

B. Remove

(1) Remove rapid fasteners and open panel.

(2) Disconnect electrical connector.

(3) Loosen indicator attachment screws.

(4) Remove indicator from front of panel.

C. Install

(1) Observe electrical safety precautions.

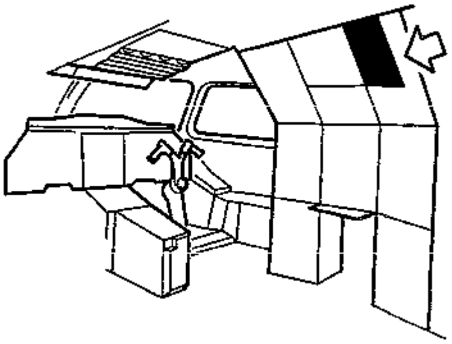
(2) Install indicator in its housing on panel.

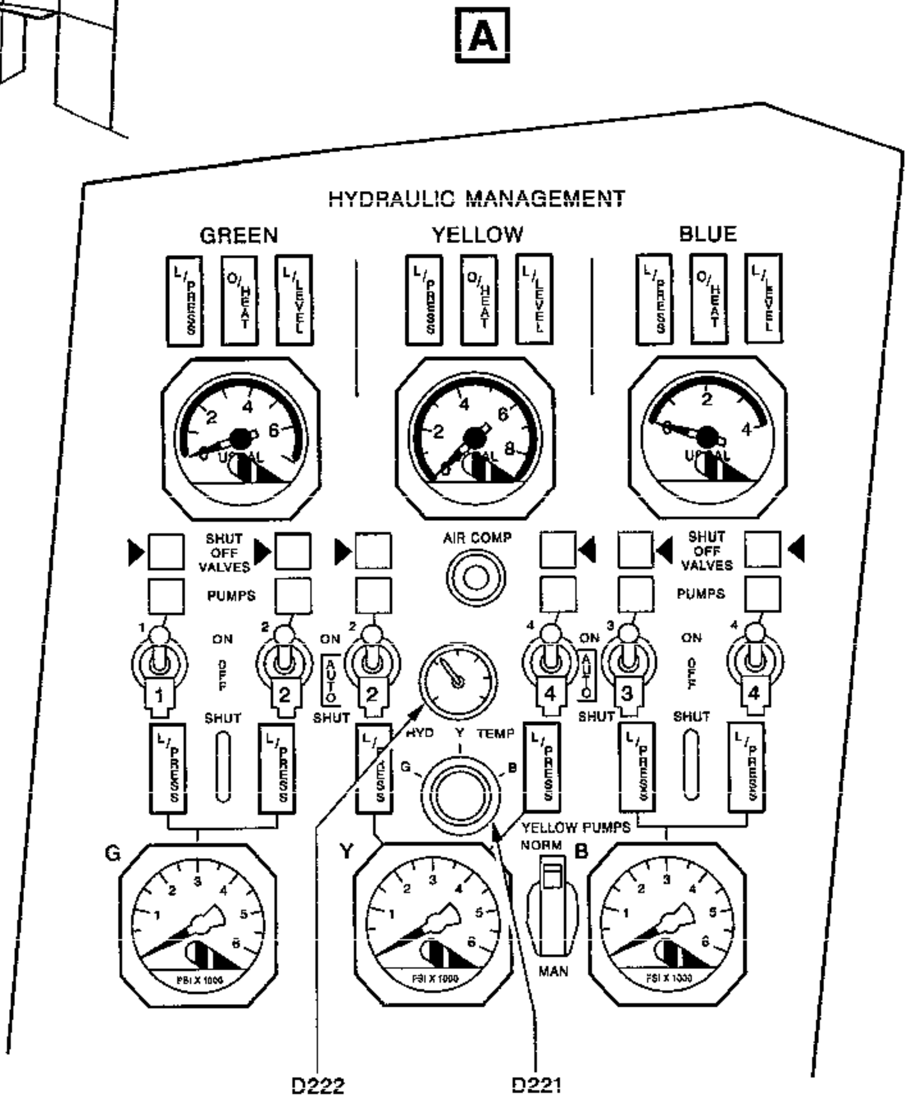
(3) Connect electrical connector.

(4) Tighten indicator attachment screws.

D. Test

Cancel electrical safety precautions and check correct operation of indicator by carrying out appropriate test procedure.





PRINTED IN ENGLAND

CMB 29 00 00 4 BCM0 00

Temperature Selector and Indicator
Figure 414

11. Temperature Selector
(Ref. Fig. 414)

A. Prepare

(1) De-energize the aircraft electrical network, and disconnect electrical ground power unit (Ref. 24-41-00, Servicing).

(2) Trip, safety and tag the following circuit breaker:

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
HYD FLUID TEMP IND	15-215	D220	D 9

(3) Loosen rapid fasteners and open the panel.

B. Remove

(1) Disconnect electrical cable from selector.

(2) Remove selector control knob.

(3) Loosen nut securing selector to panel, retain lock washer.

(4) Remove selector.

C. Install

(1) Position selector on panel. Install lock washer, tighten securing nut.

(2) Install control knob.

(3) Connect electrical cables to selector, making certain that connections are made in conformity with electrical cable identifiers and associated wiring diagrams.

D. Test

Cancel electrical safety precautions and check selector for correct operation by carrying out the appropriate test procedure.

PRINTED IN ENGLAND

12. Pressure Transmitters

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform 3-251 m (10ft. 8in)	
Circuit breaker safety clips	
Warning Notices	
Corrosion Resistan Steel Lockwire - dia 0.032 in (0.81 m/m)	

B. Prepare

(1) Take the precautions described in previous WARNING paragraph

(2) Open access door 151DB, depressurize Blue, Green and Yellow hydraulic systems (Ref. 29-11-00, 29-12-00, 29-21-00, Servicing).

(3) Open access door 153BB, depressurize Blue, Green and Yellow hydraulic tanks. (Ref. 29-13-00, Servicing).

(4) Close and wirelock tank depressurization valves.

(5) Trip, safety and tag the circuit breaker, correspon-ding to the pressure transmitter to be removed, listed on electrical identifier :

IDENTIFIER	CORRESPONDING CIRCUIT BREAKER			
	CIRCUIT BREAKER	SERVICE	PANEL	MAP REF
1D23	1D21	GREEN SYS PRESS IND	2-213	C15
3D23	3D21	BLUE SYS PRESS IND	2-212	D15
2D23	2D21	YELL SYS PRESS IND	4-213	E10

CAUTION : DISPLAY WARNING NOTICES ON ENGINES 1, 2 AND 3 PROHIBITING PRESSURIZATION OF BLUE, GREEN AND YELLOW HYDRAULIC SYSTEMS BY HYDRAULIC

Printed in England

GROUND POWER UNIT.
DISPLAY ALSO A WARNING NOTICE AT FLIGHT ENGINEER'S STATION, PROHIBITING THE USE OF GROUND PRESSURIZATION SYSTEM ELECTRIC PUMPS.

C. Remove
(Ref. Fig. 415)

(1) Disconnect electrical connector (1)

(2) Cut and remove lockwire, remove screws (6) securing transmitter

(3) Remove transmitter (2)

D. Install

(1) Position seal (4) and back-up ring (3) on transmitter

(2) Position transmitter with contact surface against collector (5)

(3) Tighten transmitter attachment screws (6)
Torque to between 0.45 m.daN (39.8 and 48.6 lbf.in)

(4) Connect electrical connector (1)

(5) Re-set circuit breaker

(6) Remove warning notices

E. Test

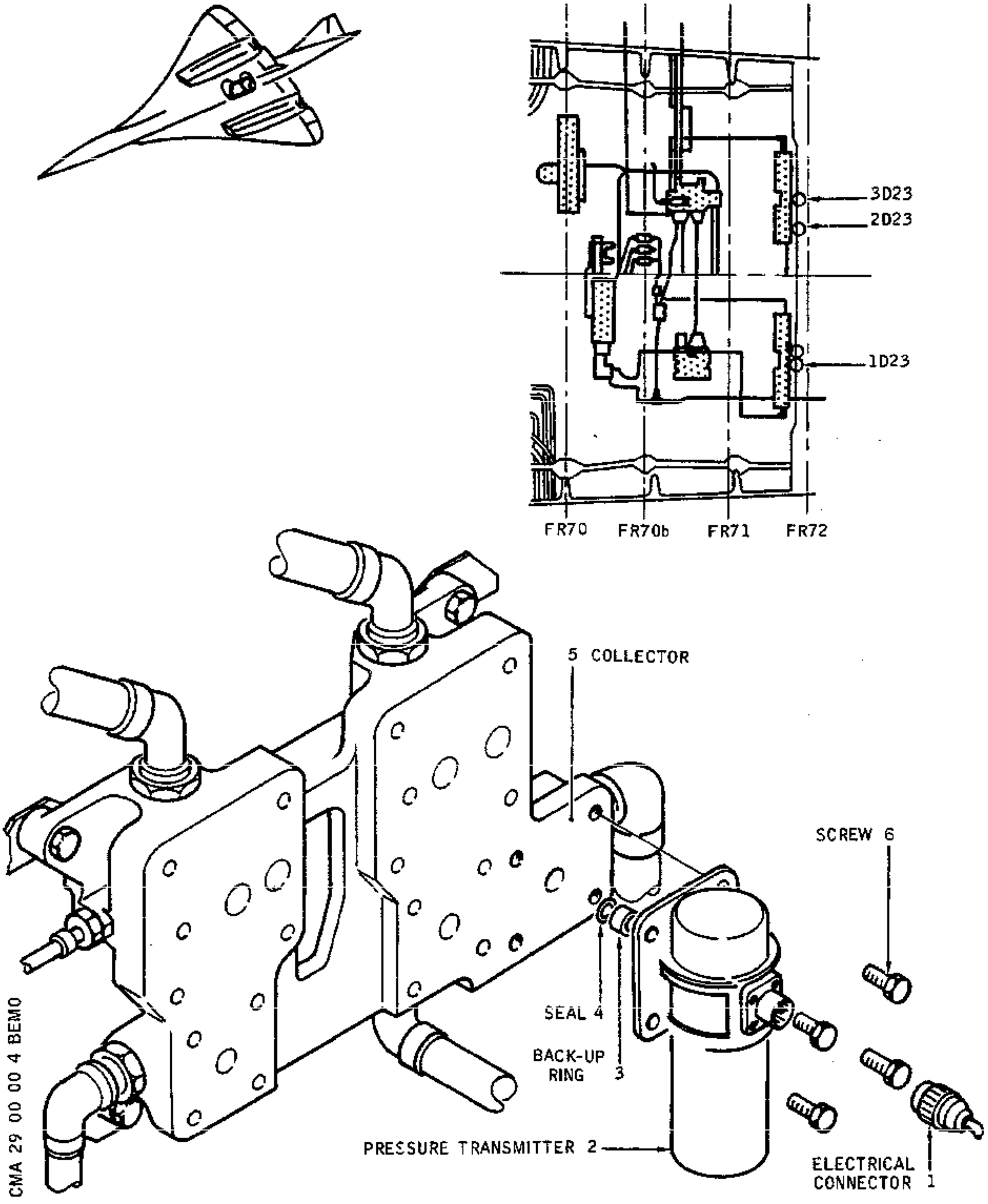
Check correct operation of pressure transmitter by carrying out appropriate test procedure.

F. Close up

(1) Make certain that working area is clean and clear of tools and miscellaneous items of equipment

(2) Close access doors

(3) Remove access platform



Pressure Transmitter Removal
Figure 415

13. Hydraulic Hose - Double-Wall

A. General

The flexible hydraulic suction, delivery and case-drain hose consists of two reinforced concentric hoses. The hydraulic fluid normally flows through the central hose, and in the event of leakage passes into the outer hose. The double-wall hoses are located on the engines.

B. Equipment and Materials

DESCRIPTION	PART NO.
Acces platform 3.251 m (10ft.8in.)	
Circuit Breaker Safety Clips	

C. Prepare

(1) Take the precautions described in previous WARNING paragraph

(2) Open access door 151DB, depressurize Blue Green and Yellow hydraulic systems (Ref. 29-11-00, 29-12-00, 29-21-00, Servicing).

(3) Open access door, depressurize Blue, Green and Yellow hydraulic tanks (Ref. 29-13-00, Servicing).

(4) Close and wirelock tank depressurization valves.

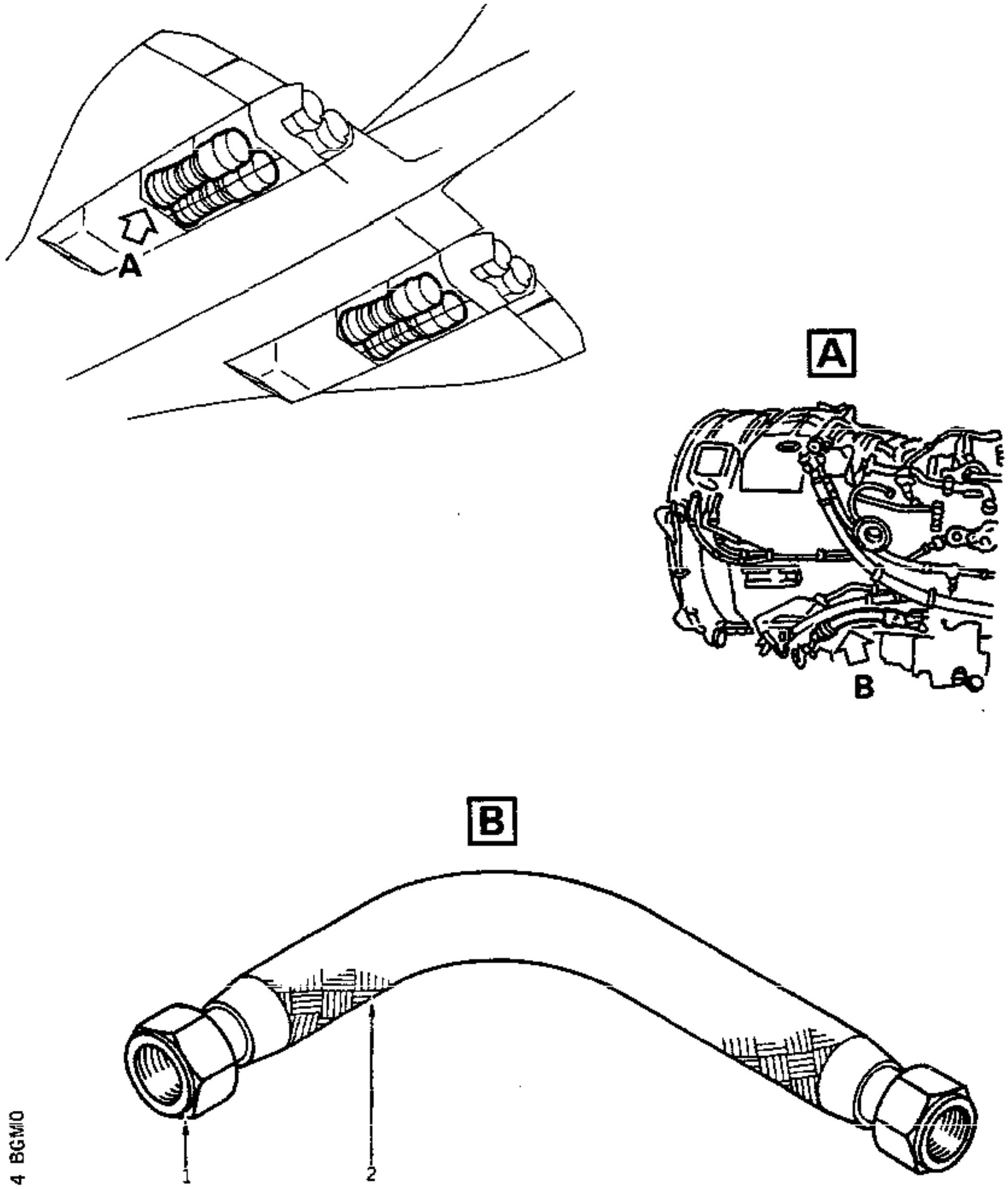
(5) Trip, safety and tag the following circuit breaker :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
HYD GRND CHECK OUT SEL VALVE CONT	15-216	M 626	F22

D. Remove
(Ref. Fig. 416)

(1) Loosen hose union nuts (1)

(2) Remove hose



CMA 29 00 00 4 BGM10

Hydraulic Hose Removal
Figure 416

WARNING : WHEN A HOSE WITH A BEND RADIUS IS REMOVED FROM AN INSTALLATION, CARE SHALL BE TAKEN NOT TO STRAIGHTEN THE HOSE FROM ITS ACQUIRED SHAPE. IF REQUIRED FOR RE-INSTALLATION IT SMALL BE FITTED AS NEAR AS POSSIBLE TO THIS SHAPE WITHOUT ANY UNDUE FORMING.

(3) Install blanking caps

E. Install

(1) Remove blanking caps

(2) Position hose

(3) Tighten union nuts

(4) Re-set circuit breaker M626

(5) Remove warning notices

F. Test

(1) To test suction hoses, pressurize hydraulic tanks (Ref. 29-13-00, Servicing) and make certain that there is no evidence of leakage.

(2) To test delivery and case drain hoses, check for evidence of leakage during first engine run-up

G. Close-up

(1) Make certain that working area is clean and clear of tools and miscellaneous items of equipment Make certain that no trace of hydraulic fluid remains.

(2) Close access doors

(3) Remove access platform.

R After SB 29-045-02 For A/C 001-007,

13. Not applicable

14. Hydraulic Pipes Above Air Intakes

A. General (Ref. Fig.417 and 418)

(1) The hydraulic lines above the air intakes consist of rigid pipes, routed in banks. They are separated from each other and secured to the air intake structure by clamp blocks.

(2) Pipes (1), (3) and (4)

Removal/Installation of these pipes requires previous Removal of air intakes (Ref. 71-00-11 - Removal/ Installation). To remove pipes above HP filters, these filters must be removed. (Ref. 29-11-73, 29-12-73 and 29-21-73, Removal/Installation).

(3) Pipes (2)

These pipes are routed along wing and engine No. 2 junction for LH side, and along wing and engine No. 3 junction for RH side.

Removal/Installation of these pipes requires removal of fairings 561AB and BB for LH side and 661AB and BB for RH side.

(4) Pipes (5)

Removal/Installation of these pipes requires lowering of ramps.
In this case, observe cautions and warnings detailed in Chapter 71-62-00, servicing.

B. Equipment and Materials

DESCRIPTION	PART NO.
Circuit Breaker Safety Clips	
Access Platform 9 ft. 8 in. (2.960 m)	
Container For Recovery of Hydraulic Fluid	
Kimwipe Tissues	

DESCRIPTION	PART NO.
Sealants (Ref. 20-30-00, No. 351)	

C. Prepare

(1) Take the precautions described in the previous WARNING paragraph.

(2) Open access door 151DB, depressurize Blue, Green and Yellow hydraulic systems (Ref. 29-11-00, 29-12-00, 29-21-00 Servicing).

(3) Open access door 153DB, depressurize Blue, Green and Yellow hydraulic Tanks (Ref. 29-13-00, Servicing).

(4) Close and wirelock tank depressurization valves.

(5) Trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
HYD GRND CHECK OUT SEL VALVE CONT	15-216	M626	F22
HYD TANK COMPR CONT	15-215	M602	D 8

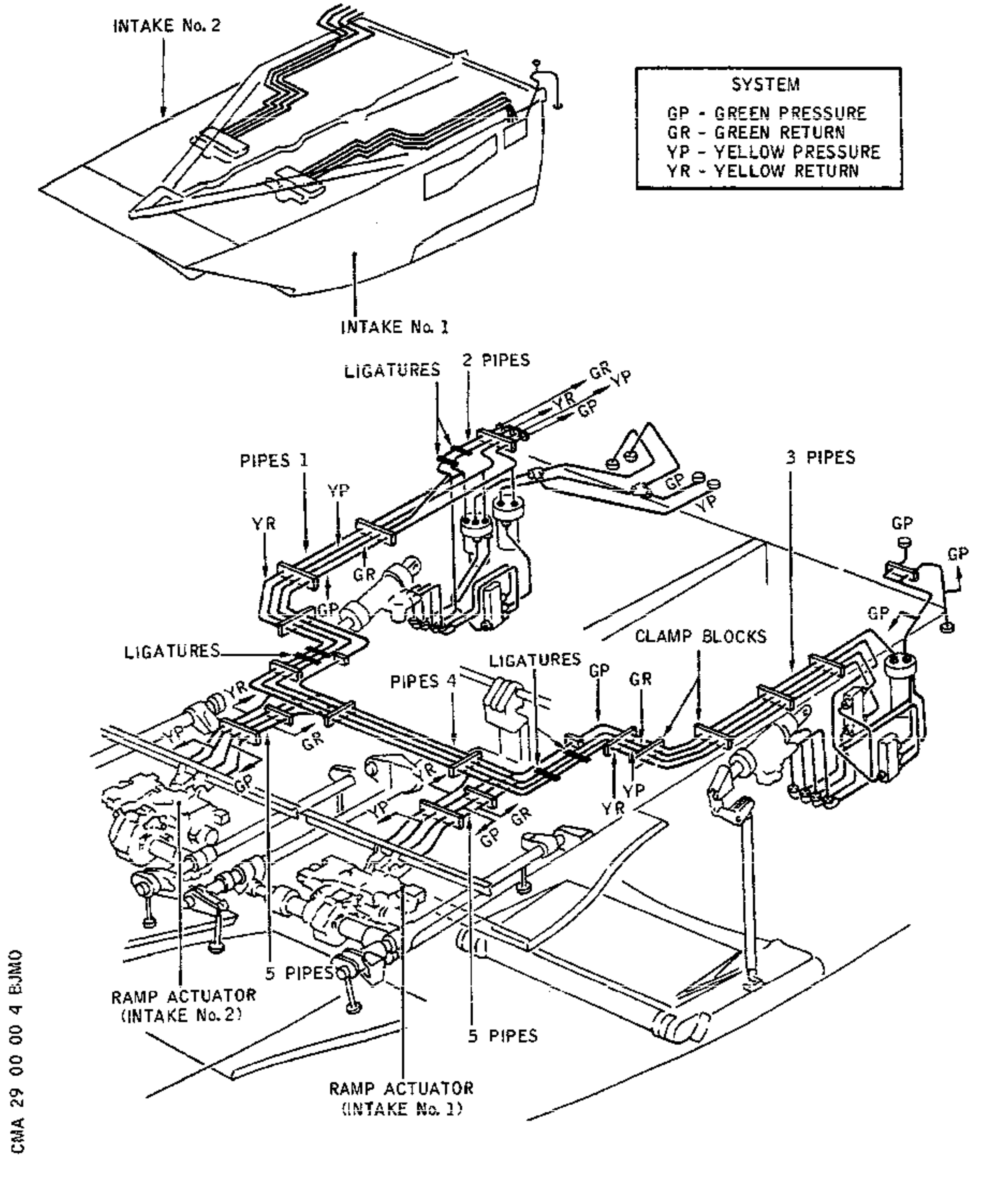
CAUTION : DISPLAY WARNING NOTICES ON ENGINES 1, 2 AND 3 PROHIBITING PRESSURIZATION OF BLUE, GREEN AND YELLOW HYDRAULIC SYSTEMS BY HYDRAULIC GROUND POWER UNIT. DISPLAY ALSO A WARNING NOTICE AT FLIGHT ENGINEER'S STATION, PROHIBITING THE USE OF GROUND PRESSURIZATION SYSTEM ELECTRIC PUMPS.

(6) Remove air intakes (Ref. 71-00-11 Removal/Installation) for removal of pipes (1), (3) and (4).

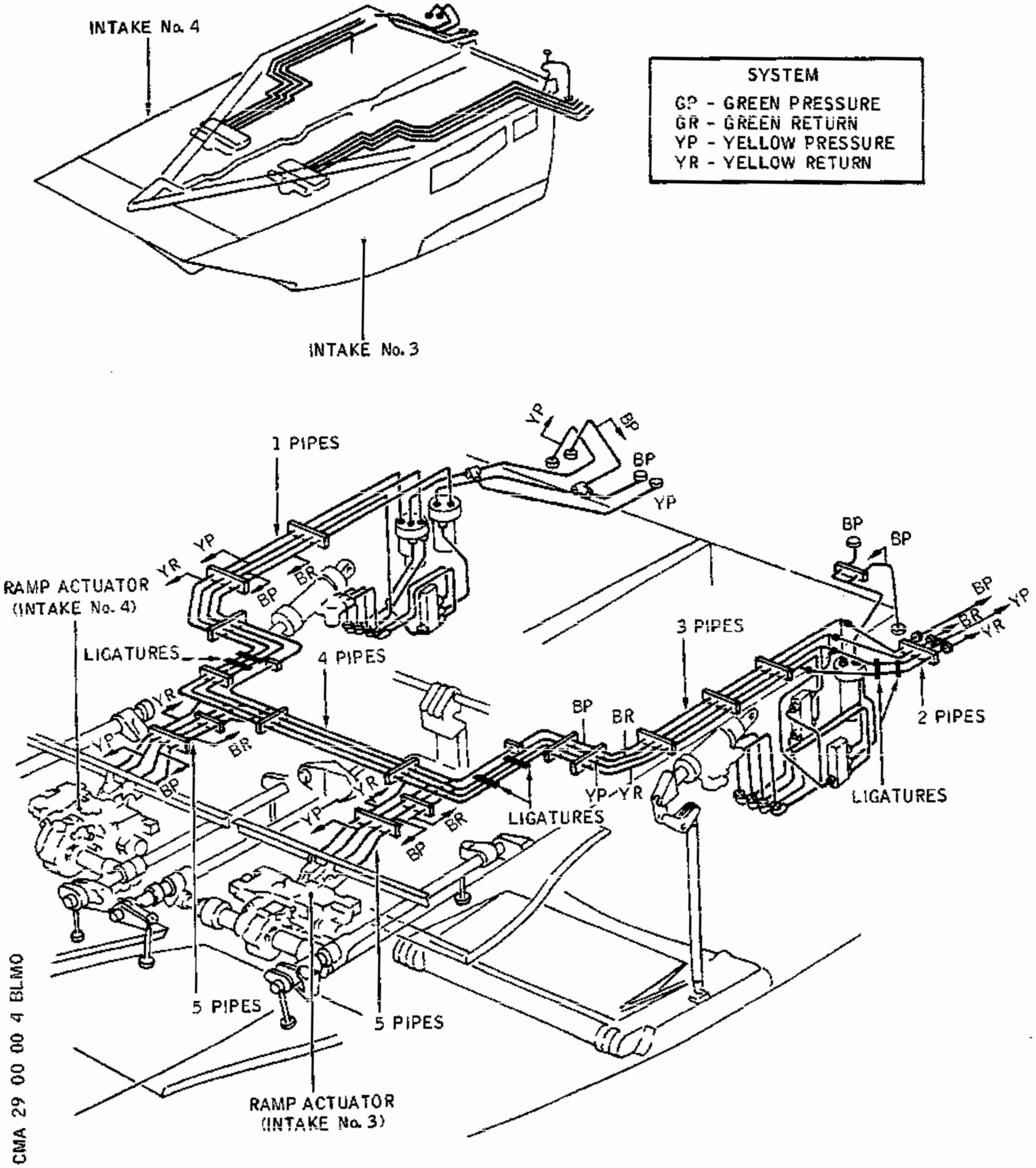
(7) Remove appropriate fairings 561AB and BB or 661AB and BB for removal of pipes (2).

(8) Lower ramps for removal of pipes (5). Observe safety precautions detailed, in Chapter 71-62-00, Servicing).

D. Remove



Hydraulic Lines Above Air Intakes 1 and 2
Figure 417



Hydraulic Lines Above Air Intakes 3 and 4.
Figure 418

(1) Remove clamp blocks.

NOTE : Some clamps blocks are equipped with split grommets, others with bushes. Note their locations so as to install them correctly.

(2) Cut away any ligatures securing the pipes together. Note their position for assembly.

(3) Remove pipe, blank off ends.

E. Preparation of Replacement Component

Clean replacement pipe before installation on aircraft (Ref. 20-23-13).

F. Install

(1) Install pipe on aircraft, check for correct positioning of the pipe within the clamps blocks. Tighten unions (Ref. 20-23-12).

(2) Position clamp blocks (Ref. 20-21-21), tighten.

(3) Install ligature (Ref. 20-23-14) and apply material No. 351 (Ref. 20-22-12).

(4) Install air intakes if removed, (Ref. 71-00-11, Removal/Installation).

G. Test

(1) Pressurize Green, Blue or Yellow hydraulic system as appropriate (Ref. 29-11-00 or 29-12-00 or 29-21-00, Servicing).

(2) Operate ramps and spill doors (Ref. 71-00-00, Servicing), flight controls in mechanical mode (Ref. 27-00-00, Servicing) so as to expel air trapped in systems).

(3) Shut down pressurization of hydraulic systems (Ref. 29-11-00 or 29-12-00 or 29-21-00, Servicing).

(4) Check installed pipes for leakage.

H. Close-Up

(1) Top up hydraulic tanks (Ref. 12-12-29).

(2) Clean working area and make certain that no trace of

hydraulic fluid remains.

(3) Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(4) Remove access platform.

WARNING : MAKE CERTAIN THAT THE POSITIONS OF NOSE AND MAIN GEAR DOORS CORRESPOND WITH THE ACTUAL POSITIONS OF THE RESPECTIVE OPERATING HANDLES.
HANDLE LOCKED, INDICATOR PLATE SHOWING WHITE : DOORS CLOSED.
HANDLE LOCKED, INDICATOR PLATE SHOWING RED : DOORS OPEN.

MAKE CERTAIN THAT THE LANDING GEAR POSITION INDICATED ON THE GEARS POSITION INDICATING UNIT CORRESPONDS WITH THE ACTUAL POSITION OF THE LANDING GEAR.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE MAKE CERTAIN THAT THE TRAVEL RANGES OF THE CONTROL SURFACES ARE CLEAR.

BEFORE PRESSURIZING HYDRAULIC SYSTEMS, CHECK THAT ALL CONTROLS ARE SET TO CORRESPOND WITH THE ACTUAL POSITION OF THE SERVICES THEY OPERATE.

MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

1. General

This topic describes the procedure for checking the servo control shuttle valves for internal leakage.

A. Equipment and Materials

DESCRIPTION	PART NO.
Electrical Ground Power Unit	
Access Platform 9 ft.8in. (2.960 m)	
Ground Power Unit-Hydraulic Power and Preliminary Testing	EMH 389E

B. Prepare

(1) Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing).

(2) Open access doors 151DB and 153BB under the fuselage.

(3) Make certain that Blue and Yellow hydraulic tanks are

pressurized.

(4) Trip safety and tag the following circuit-breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
INT 1 MAIN HYD SUP	1-213	1K1950	D 9
INT 2 ST'BY HYD SUP		2K1960	E 9
PFCS INV GRN FAIL IND		1C 73	M15
AUDIO WARN SYS SUP 1		W 371	M21
PFCS ALL SURFACES MON GRN SUP		1C 54	N13
RELAY JACK HYD SEL IND & SUP		C 281	N17
PFC IND		C 287	N18
MWS SUP1		W 252	N21
YEL/GRN GRN FAIL - PFC & RELAY JACK "A" SYS CONT		C 285	P16
YEL/BLUE BLUE FAIL - PFC & RELAY JACK "A" SYS CONT		C 286	P17
YELL LL - PFC & RELAY JACK "A" SYS CONT		C 288	P18
FLT CONT POSN IND CONT		C 83	R11
FLT CONT POSN IND 26V 400Hz SUP	2-213	C 84	B 4
AICU 4B SUP		4K2051	B14
AICU 1A SUP		1K2050	D14
FLT CONT & NAV BUS		X 355	H 2
AICU 3A SUP		3K2050	H13
AICU 2B SUP		2K2051	H14
YELL L/LEVEL - PFC & RELAY JACK "B" SYS CONT	3-213	C 282	A 8
YELL/GRN GRN FAIL - PFC & RELAY JACK "B" SYS CONT		C 283	A 9
YELL/BLUE BLUE FAIL - PFC & RELAY JACK "B" SYS CONT		C 284	A10
INT 4 ST BY HYD SUP	5-213	4K1960	A 6
INT 3 MAIN HYD SUP		3K1950	A 7
AUDIO WARN SYS SUP 2		W 372	C17
MWS SUP 2		W 251	D15
PFCS INV BLUE FAIL IND		2C 73	E11
PFCS ALL SURFACES MON			

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
BLUE SUP		2C 54	E12
AICU 2A SUP	13-216	2K2050	A 3
AICU 3B SUP		3K2051	B 3
AICU 1B SUP	14-216	1K2051	A 5
HYD GRND CHECK OUT PUMP CONT		M 656	A16
AICU 4A SUP		4K2050	B 5
INT 2 MAIN HYD SUP	15-215	2K1950	B18
INT 3 ST BY HYD SUP		3K1960	C18
INT 4 MAIN HYD SUP	15-216	4K1950	A 8
INT 1 ST BY HYD SUP		1K1960	B 8
HYD GRND CHECK OUT SEL VALVE CONT		M 626	F22

(5) Depressurize the Green hydraulic system (Ref. 29-11-00, Servicing)

C. Check

(1) Hydraulic fluid transfer from Yellow to Green tank

(a) Depressurize Green hydraulic tank (Ref. 29-13-00, Servicing).

(b) Pressurize Blue and Yellow hydraulic systems (Ref. 29-12-00 and 29-21-00, Servicing). Allow pressure to stabilize in these systems for 10 minutes.

(c) On Flight Engineers' AIR INTAKE panel, place air intake control switches in AUTO position.

(d) On overhead panel SERVO CONTROLS unit, place control switch in YELLOW GREEN position.

(e) Carefully note hydraulic fluid level in tanks.

(f) Maintain pressure for 15 minutes in Blue and Yellow systems.

(g) Check fluid level in hydraulic tanks and make

certain that there is no fluid transfer from Yellow to Green tank. If any transfer is noticed, refer to topic 29-00-00, Trouble Shooting - Isolation of faulty shuttle valves.

(h) Shut down Blue and Yellow hydraulic systems (Ref. 29-12-00 and 29-21-00, Servicing) and remove Blue system hydraulic ground power unit.

(i) Pressurize Green hydraulic system (Ref. 29-13-00, Servicing).

(2) Hydraulic fluid transfer from Yellow to Blue tank.

(a) Depressurize Blue hydraulic tank (Ref. 29-13-00, Servicing).

(b) Pressurize Green and Yellow hydraulic systems (Ref. 29-11-00 and 29-21-00, Servicing). Allow pressure to stabilize in these systems for 10 minutes.

(c) On overhead panel SERVO CONTROLS unit, place control switch in YELLOW BLUE position.

(d) Carefully note hydraulic fluid level in tanks.

(e) Maintain pressure for 15 minutes in Green and Yellow systems.

(f) Check fluid level in hydraulic tanks and make certain that there is no fluid transfer from Yellow to Blue tank.
If any transfer is noticed, refer to topic 29-00-00, Trouble Shooting - Isolation of faulty shuttle valves.

(g) Shut down Green and Yellow hydraulic systems (Ref. 29-11-00 and 29-21-00, Servicing).

(h) Pressurize Blue hydraulic tank (Ref. 29-13-00, Servicing).

D. Close-Up

(1) De-energize the aircraft electrical network and disconnect electrical ground power unit (Ref. 24-41-00, Servicing).

(2) Close access doors

(3) Remove access platforms.

GENERAL - INSPECTION/CHECK

1. General

Carry out a systematic inspection of all Green, Blue and Yellow system high and low pressure hydraulic lines. Check for external leakage.

Check that hydraulic lines do not touch each other, or the structure.

2. Permissible External Hydraulic Leakage

Checks for leakage shall be made with the hydraulic systems pressurized.
All hydraulic jacks on the aircraft shall be operated if possible to establish whether the leakage varies with the travel of the jack.
In the case of metal-to-metal seals (unions, for example) check tightening torque if leakage occurs.
A component with external leakage can be retained on the aircraft for several flights on condition that the rate of leakage is less than twice that of the specified rate, and that the system overall leakage rate is acceptable.
R The latter must not exceed 50 drops per minute, or 150 cm^3 per hour (20 drops = 1cm^3 approximately).

Permissible external leakage from components :

COMPONENT	MAX. EXTERNAL LEAKAGE
Engine Driven Hydraulic Pump	5 drops per 3 minutes
Electric Pump	5 drops per 3 minutes
Hydraulic Motor	5 drops per 3 minutes
Servo Controls	2 drops per minute on any one servo control
Seals on moving units	5 drops per 3 minutes (whether in motion or stationary)
Static Seals	1 drop per 10 minutes
Hydraulic Lines, Fittings	No leakage permissible

3. Hydraulic Tanks

A. Equipment and Materials

DESCRIPTION	PART NO.
Access platform 3.141 m (10 ft 8 in)	-

B. Prepare

(1) Position access platform.

(2) Open door 153BB.

C. Inspection/Check

(1) Pressurize the tanks to more than 29 psi (2 bar) (Ref. 29-13-00, Servicing).

(2) Visually inspect (attachment, leakage, deformation).

RB (3) Check bellows.

RB (a) Make certain that there is no fluid in the air
RB compartment, by means of the depressurization
RB valve sight glass.

RB (b) If hydraulic fluid is present, proceed to drain
RB sight glass (Ref. 29-00-00, Servicing).

RB Raise Cat Q ADD to re-check tank depressurization
RB valve sight glass at next LHR transit. If fluid
RB found at re-check then cause must be investigated
RB further to avoid loss of hydraulic system
RB contents.

RB (c) If necessary, re-pressurize the tanks to more
RB than 29 psi (2 bar) (Ref. 29-13-00, Servicing).

R

(4) Check fluid level
- A direct reading indicator on the lower part of each tank indicates the fluid level.

Normal levels:
Green tank : 4 US gal. (15 litres, 3.3 Imp gal.)

PRINTED IN ENGLAND

R Blue tank : 2.1 US gal. (8 litres, 1.75 Imp gal.)
R Yellow tank : 6.6 US gal. (25 litres, 5.5 Imp gal.).

R The tanks must be topped up when the level falls to :
R Green tank : 3.4 US gal. (13 litres, 2.9 Imp gal.)
R Blue tank : 1.7 US gal. (6.5 litres, 1.4 Imp gal.)
R Yellow tank : 6.1 US gal. (23 litres, 5.1 Imp gal.).

D. Close-Up

(1) Close access door.

(2) Remove access platform.

4. Valves - Tank De-Aerator Safety

The valves are located in zone 153, and are accessible through access door 153BB.

A. Equipment and Materials

DESCRIPTION	PART NO.
Access platform 3.141 m (10 ft 8 in)	-

B. Prepare

(1) Position access platform.

(2) Open access door 153BB.

C. Inspection/Check

(1) Visually inspect valves (attachments).

(2) If "full" indicator appears, proceed to drain valve (Ref. 29-00-00, Servicing).

RB Raise Cat Q ADD to re-check tank de-aerator safety
RB valve at next LHR transit. If fluid found at re-check
RB then cause must be investigated further to avoid loss
RB of hydraulic system contents.

(3) Check associated accumulator pre-charge pressure (Ref. 29-00-00, Inspection/Check).

D. Close-Up

(1) Close access door 153BB.

(2) Remove access platform.

PRINTED IN ENGLAND

5. Filter Assembly - Tank Return

These filters are located in zone 153 and are accessible through access door 153BB.

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform 3.141 m (10 ft. 8 in.)	

B. Prepare

(1) Position access platform.

(2) Open access door 153BB.

C. Inspection/Check

Check that clogging indicators are not protruding. If they are protruding, replace filter elements (Ref. 29-00-00, Servicing).

D. Close-Up

(1) Close access door.

(2) Remove access platform.

6. Filters - Pump Case Drain

A. Filter Location and Access

REF	DESCRIPTION	PANEL	ACCESS ZONE	ACCESS DOOR
3139	Filter - Eng 2 Green hyd sys pump case drain		531	BT
3140	Filter - Eng 1 Green hyd sys pump case drain		532	CT
3238	Filter - Eng 4 Blue hyd sys pump case drain		631	BT
3239	Filter - Eng 3 Blue hyd sys pump case drain		631	BT
3336	Filter - Eng 2 Yellow hyd sys pump case drain		531	BT
3337	Filter - Eng 4 Yellow hyd sys pump case drain		631	BT
4319	Filter - Blue/Yellow electric pump case drain		641	AB
4320	Filter - Green/Yellow electric pump case drain		541	AB

B. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform 3.141 m (10 ft. 8 in.)	

C. Prepare

(1) Position access platform.

(2) Open access door to filter concerned.

D. Inspection/Check

Check that clogging indicators are not protruding. If they are protruding, replace filter elements (Ref. 29-00-00, Servicing).

E. Close-Up

(1) Close access door.

(2) Remove access platform.

7. Filters - Delivery

A. Delivery Filters - Location and Access

REF	DESCRIPTION	PANEL	ACCESS ZONE	ACCESS DOOR
3126	Filter - Eng 2 Green hyd sys pump delivery		421	JR
3127	Filter - Eng 1 Green hyd sys pump delivery		411	JL
3763	Filter - Artificial feel delivery, Green hyd sys		121	GB
3226	Filter - Eng 3 Blue hyd sys pump delivery		431	JL
3227	Filter - Eng 4 Blue hyd sys pump delivery		441	JR
3783	Filter - Artificial feel delivery, Blue hyd sys		121	GB
3325	Filter - Eng 2 Yellow hyd sys pump delivery		421	JR
4026	Filter - Eng 4 Yellow hyd sys pump delivery		441	JR
4131	Filter - Blue/Yellow electric pump delivery		641	AB
4132	Filter - Green/Yellow electric pump delivery		541	AB
5081	Filter - Ram air turbine Green hyd sys delivery line		542	AB
5082	Filter - Ram air turbine Yellow hyd sys delivery line		542	AB

B. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform 3.141 m (10 ft. 8 in.)	

C. Prepare

(1) Position access platform.

(2) Open access door to filter concerned.

D. Inspection/Check

Check that clogging indicators are not protruding.

If they are protruding, replace filter elements (Ref. 29-00-00, Servicing).

E. Close-Up

(1) Close access door.

(2) Remove access platform.

Printed in England

8. Accumulators

The accumulators are located in zone 151, and are accessible through access door 151DB.

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform 3.141 m (10 ft 8 in)	-

B. Prepare

(1) Install access platform.

(2) Open access door 151DB.

C. Inspection/Check

(1) Visually inspect accumulator (attachments, leakage).

RB (2) Check accumulator nitrogen pressure in accordance with
RB Table 601. Depending on the pressure reading, carry
RB out action as follows:

RB (a) Pressure reading = table value ± 100 psi:
RB correct, no further action.

RB (b) Pressure reading = table value ± 300 psi:
RB charge accumulator, in accordance with 29-00-00,
RB Servicing, para.4 - Accumulator Charging.
RB Raise an ADD to re-check in accordance with AMM
RB 29-00-00, Inspection/Check after 50 flying hours.

RB (c) If pressure reading differs from table value by
RB more than ± 300 psi: replace the accumulator.

RB (d) If accumulator is discharged for any reason:
RB replace the accumulator.

PRINTED IN ENGLAND

TEMPERATURE	PRESSURE
-20°C	1848 PSI
-10°C	1952 PSI
0°C	2055 PSI
+10°C	2175 PSI
+20°C	2294 PSI
+30°C	2390 PSI
+40°C	2484 PSI
+60°C	2645 PSI

Accumulator Nitrogen Pressure
Table 601

PRINTED IN ENGLAND

B (3) If pressure is incorrect check the associated reservoir de-aerator valve (Ref. Inspection/Check para. 4.).

D. Close-Up

(1) Close access door.

(2) Remove access platform.

9. Not applicable

10. Pumps - Engine-Driven

The engine-driven pumps are located on the following engines :

Green system pumps - engines 1 and 2
Blue system pumps - engines 3 and 4
Yellow system pumps - engines 2 and 4

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform 1.803 m (5 ft. 11 in.)	

B. Prepare

(1) Install access platform.

(2) Open engine cowls as appropriate for pump to be inspected.

C. Inspection/Check

(1) Visually inspect pump (attachments).

(2) Check for leakage.

D. Close-Up

(1) Close engine cowls.

(2) Remove access platform.

11. Fluid Contamination and Sampling on Aircraft

WARNING : MAKE CERTAIN THAT THE POSITIONS OF NOSE AND MAIN GEAR DOORS CORRESPOND WITH THE ACTUAL POSITIONS OF THE RESPECTIVE OPERATING HANDLES.
HANDLE LOCKED, INDICATOR PLATE SHOWING WHITE : DOORS CLOSED.
HANDLE LOCKED, INDICATOR PLATE SHOWING RED : DOORS OPEN.

MAKE CERTAIN THAT THE LANDING GEAR POSITION INDICATED ON THE GEARS POSITION INDICATING UNIT CORRESPONDS WITH THE ACTUAL POSITION OF THE LANDING GEAR.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE, MAKE CERTAIN THAT THE TRAVEL RANGES OF THE CONTROL SURFACES ARE CLEAR.

BEFORE PRESSURIZING HYDRAULIC SYSTEMS, CHECK THAT ALL CONTROLS ARE SET TO CORRESPOND WITH THE ACTUAL POSITION OF THE SERVICES THEY OPERATE.

MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

A. General

Contamination is the description given to all foreign matter found in hydraulic fluid, which could affect the fluid itself, or the mechanical parts in which it circulates.
The problem of hydraulic fluid contamination on aircraft has become one of major importance owing to the utilization of a large number of servo valves, particularly in the flight control system. Strict instructions therefore have to be complied with if the contamination level is to be kept within the required limits.

B. Contamination Check

The degree of contamination is ascertained by counting the number of particles on a MILLIPORE filter through which 100 cm^3 of fluid being examined has been filtered.
If a sample taken during a test reveals a rejection rate equal to one of the values given below, the test shall be stopped and the fluid reclaimed in the system concerned.
Hydraulic fluid contamination level limits are given in the following table :

PARTICLES DIMENSIONS	NO. OF PARTICLES CONTAINED IN 100cm³ OF FLUID FINAL OR REJECTION CONDITION
5µ - 15µ	32.000
15µ - 25µ	5.700
25µ - 50µ	1.012
50µ - 100µ	.180
greater than 100µ	.32

C. Check of Hydraulic Fluid Characteristics

The following table lists the hydraulic fluid characteristics, test methods and permissible in-service limits.

CHARACTERISTICS	TEST METHOD	IN-SERVICE FLUID LIMITS
Flash point	ASTM-D-92-66	160°C min.
Water content	ASTM-D-1744-64	250 ppm max.
Density at 20°C	ASTM-D-70-52	0.925 to 0.955 g/cm³
Chlorine content		0.01% max.

D. Sampling Valves

Fluid samples are taken from sampling valves installed in each hydraulic system.
The valves are located in the upper part of zone 151, and are accessible through door 151DB.

E. Equipment and Materials

DESCRIPTION	PART NO.
Ground Power Unit - Hydraulic Power and Preliminary Testing	EMH398E
Electrical Ground Power Unit	
RB Sampling Bottle kit-3-29-1531-1BA	
Special Gasoline H (Ref. 20-30-00 - Product NO.478)	

DESCRIPTION	PART NO.
Corrosion Resistant Steel Lockwire Dia 0.032 in. (0.8 mm)	

F. Prepare

(1) Take the precautions described in previous WARNING paragraph.

(2) Pressurize hydraulic tanks (Ref. 29-13-00, Servicing).

(3) Pressurize the system to be checked :

Green Hydraulic System - Pressurization/Depressurization (Ref. 29-11-00, Servicing)
Blue Hydraulic System - Pressurization/Depressurization (Ref. 29-12-00, Servicing)
Yellow Hydraulic System - Pressurization/Depressurization (Ref. 29-13-00, Servicing)

(4) Connect electrical ground power unit and energize the aircraft electrical network.

(5) Open access door 151DB providing access to sampling valves.

G. Sampling Procedure

NOTE : The flow of hydraulic fluid shall be maintained by operating aircraft services, other than landing gear and visor, so that the fluid passes through all units in the system at least twice.

(1) Cut lockwire and remove protective cap from valve on the system to be checked, and clean outlet port with solvent (Product NO.478).

CAUTION : TO OPEN SAMPLING VALVE AND LOOSEN CAP, VALVE BODY MUST BE HELD IN PLACE BY MEANS OF A WRENCH.

RB (2) Take sampling bottle from kit (3-29-1531-1BA).

(3) With system in operation, open sampling valve and

drain off a minimum 200 cm^3 (0.2 litres, 0.44 UK gal, 0.052 US gal) in order to flush the valve.

NOTE : Once the sampling valve has been opened it must not be handled again during the sampling operation.

(4) Remove sampling bottle cap and hold it in one hand.

(5) Position the bottle immediately in the fluid stream until the sample drawn off reaches the level required of 200 cm^3 (0.2 litres, 0.044 UK gal, 0.052 US gal).

(6) Remove sampling bottle and close it with capsule and cap.

(7) Close sampling valve. Make certain that there is no leakage.
Do not wipe off any drops of fluid on the sampling valve or bottle.
Install cap on valve, moderately tighten (by hand), and wirelock.

CAUTION : TO CLOSE SAMPLING VALVE AND TIGHTEN CAP, VALVE BODY MUST BE HELD IN PLACE BY MEANS OF A WRENCH.

RB (8) Place sampling bottle in sampling kit box, and dispatch immediately to the test laboratory.

H. Close-Up

(1) Shut down hydraulic power source of the system concerned :

Green hydraulic system - Pressurization/Depressurization (Ref. 29-11-00, Servicing)
Blue hydraulic system - Pressurization/Depressurization (Ref. 29-12-00, Servicing)
Yellow hydraulic system - Pressurization/Depressurization (Ref. 29-13-00, Servicing).

(2) Disconnect and remove hydraulic ground power unit.

(3) De-energize the aircraft electrical network and disconnect electrical ground power unit (Ref. 24-41-00, Servicing).

(4) Close access door 151DB.

(5) Remove access platform.

12. Measurement of Internal Leakage

A. General

The following procedures are intended to measure hydraulic system internal leakage, so as to check :
- that total leakage in any one system remains within the specified limits
- the degree of component wear.

Leakage is measured by isolating a number of services, by means of simple manoeuvres, and measuring the leakage at the services still supplied with hydraulic power.

B. Internal Leakage Tests : Green System (Ref. Fig. 601)

(1) Equipment and Materials

DESCRIPTION	PART NO.
Access Platform	
Ground Power Unit - Hydraulic - Power and Preliminary Testing	EMH 398 E
Flowmeter Capable of 99.5% to 99.7% Precision Withing a Range of 0.5 to 25 l/min.	
Electrical Ground Power Unit	

(2) Prepare

(a) Make certain that the following circuit breakers are set :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
NOSE UC WEIGHT SW "A" SYS SUP	1-213	G 291	M16
LH UC WEIGHT SW "A" SYS SUP		G 292	M17
RH UC WEIGHT SW & DOWN-LOCK "A" SYS SUP		G 295	M18

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
UC POSN IND		G 51	N16
LH UC WEIGHT SW & DOWN-LOCK "B" SYS SUP	3-213	G 293	B 8
NOSE W/C W/SW "B" SYS SUP		G 296	D 8
UC RAISE DOORS CLOSE UP	15-215	G 1	A 6
UC SELECTOR RAISE CONT		G 2	A 7
UC LOWER DOORS OPEN SUP		G 3	A 8
UC SELECTOR LOWER CONT		G 4	A 9
EMER BRAKE PRESS IND	2-213	G 112	E15
PLTS LT TEST SUP	15-215	L1001	E14
BRAKE ACCUM PRESS IND	13-216	G 111	A12
WHEELS BRAKE "B" SYS CONT	15-216	G 132	B18
BRAKE EMER/ACCUM PRESS IND	25-216	G 118	C 6
BRAKE EMER/ACCUM/ WATER PIPE HTR CONT		G 119	B 7

(b) Connect hydraulic ground power unit to Green system ground connectors (Ref. 29-11-00, Servicing). Install a flowmeter between ground power unit and delivery ground connector.

(c) Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing).

(d) Pressurize Green system (Ref. 29-11-00, Servicing).

(e) On overhead panel :
On Flight Control Unit, place BLUE INVERTER and GREEN INVERTER switches in ON position. Check that O & M ELEVONS, IN ELEVONS and RUDDER switches are in MECH position.

(f) Jack up aircraft (Ref. 07-11-00).

(g) With aircraft on jacks, nose wheel steering system leakage rate is measured by simulating compression of nose gear shock absorber throughout duration of Green system test, as follows :

(g1) Trip, safety and tag circuit breaker G291.

(g2) Disconnect plug G320A located on nose gear leg.

(g3) Install a shorting jumper between sockets A and C of plug G320A.

(g4) Set circuit breaker G291.

(g5) Check that NOSE WHEEL and STEERING warning lights are off.

(3) Measure Flow Rate Q1

(a) Prepare

(a1) PFCUs
On overhead panel
- on SERVO CONTROLS unit, place selector switches in NORMAL. Check that BLUE L. PRESS caption light is on, and that GREEN L. PRESS caption light is off.
- place O & M ELEVONS, IN ELEVONS and RUDDER switches in GREEN position, and press associated RESET push buttons.

On First Officer's instrument panel, at ICOVOL indicator, check that the eight magnetic indicators display G.

(a2) Relay jacks
- On overhead panel, RELAY JACK unit, place switch in GREEN ONLY position.
- Engage auto pilot 2 (Ref. 22-10-00, Servicing, AP2 Engagement).

(a3) Air intakes
- On Flight Engineer's AIR INTAKES panel, check that RAMP SPILL MASTER switches are in AUTO position.

(a4) Droop nose/visor
- On First Officer's instrument panel, check that VISOR/NOSE selector switch is in DOWN position (nose and visor lowered).

INTENTIONALLY BLANK

			REFER TO DETAILED PROCEDURE, PARAGRAPH 12 B							
		(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
PFCU'S	(a1)	HYD PWR: NORMAL GREEN ELECTRICAL MODE	HYD PWR : BLUE ONLY →	→	→	→	→	→	→	
RELAY JACKS	(a2)	HYD PWR : GREEN ONLY AP2 ENGAGED →		BLUE ONLY →	→	→	→	→	→	
AIR INTAKES	(a3)	AUTO →	→		MAN →	→	→	→	→	
DROOP NOSE VISOR	(a4)	DOWN →	→	→		UP →	→	→	→	
ARTIFICIAL FEEL No. 2 (PITCH, ROLL, YAW)	(a5)	ON (ADC2 ON) →	→	→	→		OFF →	→	→	
BRAKING	(a6)	BRAKE SELECTOR LEVER IN "NORM" →	→	→	→	→		PEDALS DEPRESSED	PEDALS RELEASED →	
NOSE WHEEL STEERING	(a7)	SAFETY KEY REMOVED →	→	→	→	→	→		SAFETY KEY INSTALLED	SAFETY KEY REMOVED
LANDING GEAR	(a8)	LG NORMAL CONTROL LEVER IN "DOWN" →	→	→	→	→	→	→	→	RETRACT LANDING GEAR IF AIRCRAFT IS ON JACKS
STABILIZED FLOW RATE READ ON FLOWMETER	(a9)	Q1 =	Q2 = Q1-Q2 = QA	Q3 = Q2-Q3 = QB	Q4 = Q3-Q4 = QC	Q5 = Q4-Q5 = QD	Q6 = Q5-Q6 = QE	Q7 = Q7-Q6 = QF	Q8 = Q6-Q8 = QG	Q9 = Q9-Q8 = QH

CMA 29 00 00 6 AAM0

Chart A
Internal Leakage Tests : Green System
Figure 601

(a5) Artificial feel
- On centre console, ADC control panel, place ADC 2 switch in ON position, and test selector switch in NORM position. If amber ADC 2 warning light is on, press then release to extinguish.
- On overhead panel, ARTIFICIAL FEEL NO.2 engage switch unit, engage PITCH,ROLL and YAW switches.

(a6) Braking
- On centre console, check that brake selector lever is in NORM position.

(a7) Nose wheel steering
- Remove safety key C22646 from interphone box on nose gear leg.

(a8) Landing gear
- On First Officer's instrument panel, place landing gear normal control lever in DOWN position.

(b) Measure
- Read stabilized flow rate on flowmeter, and record rate in square Q1 of chart A.

(4) Measure Flow Rate Q2

(a) Prepare

(a1) PFCUs
- On overhead panel, SERVO CONTROLS unit, place upper selector switch in BLUE ONLY position. Check that GREEN L. PRESS caption light comes on.
- On First Officer's instrument panel, ICOVOL indicator, check that the eight magnetic indicators display M.
- On master warning panel, cancel PFC warning.

(a2) Relay jacks
- No action

(a3) Air intakes
- No action

(a4) Droop nose/visor
- No action

(a5) Artificial feel
- No action

(a6) Braking
- No action

(a7) Nose wheel steering
- No action

(a8) Landing gear
- No action

(b) Measure
- Read stabilized flow rate on flowmeter and record rate in square Q2 of chart A.
- Calculate Q1-Q2 = QA, and compare result with maximum value given in chart D. If result is greater than maximum value, refer to ACTION column of chart D.

(5) Measure Flow Rate Q3

(a) Prepare

(a1) PFCUs
- No action

(a2) Relay jacks
- On overhead panel, RELAY JACK unit, place switch in BLUE ONLY position.

(a3) Air intakes
- No action

(a4) Droop nose/visor
- No action

(a5) Artificial feel
- No action

(a6) Braking
- No action

(a7) Nose wheel steering
- No action

(a8) Landing gear
- No action

(b) Measure
- Read stabilized flow rate on flowmeter, and

record rate in square Q3 of chart A.
- Calculate Q2-Q3 = QB, and compare result with maximum value given in chart D. If result is greater than maximum value, refer to ACTION column of chart D.

(6) Measure Flow Rate Q4

(a) Prepare

(a1) PFCUs
- No action

(a2) Relay jacks
- No action

(a3) Air intakes
- On First Engineer's AIR INTAKES panel, place RAMP SPILL MASTER switches in MAN position (air intakes of engines 1 and 2).

(a4) Droop nose/visor
- No action

(a5) Artificial feel
- No action

(a6) Braking
- No action

(a7) Nose wheel steering
- No action

(a8) Landing gear
- No action

(b) Measure
- Read stabilized flow rate on flowmeter, and record rate in square Q4 of chart A.
- Calculate Q3-Q4 = QC, and compare result with maximum value given in chart D. If result is greater than maximum value, refer to ACTION column of chart D.

(7) Measure Flow Rate Q5

(a) Prepare

(a1) PFCUs
- No action

(a2) Relay jacks
- No action

(a3) Air intakes
- No action

(a4) Droop nose/visor
- On First Officer's instrument panel, place VISOR/NOSE selector switch in 0° then UP positions, to raise nose and visor.

(a5) Artificial feel
- No action

(a6) Braking
- No action

(a7) Nose wheel steering
- No action

(a8) Landing gear
- No action

(b) Measure
- Read stabilized flow rate on flowmeter, and record rate in square Q5 of chart A.
- Calculate Q4-Q5 = QD, and compare result with maximum value given in chart D.
If result is greater than maximum value, refer to ACTION column of chart D.

(8) Measure Flow Rate Q6

(a) Prepare

(a1) PFCUs
- No action

(a2) Relay jacks
- No action

(a3) Air intakes
- No action

(a4) Droop nose/visor
- No action

(a5) Artificial feel
- On centre console, ADC control panel, place ADC 2 switch in OFF position.
On overhead panel, ARTIFICIAL FEEL No. 2

engage switch unit, PITCH, ROLL and YAW switches should disengage.

(a6) Braking
- No action

(a7) Nose wheel steering
- No action

(a8) Landing gear
- No action

(b) Measure
- Read stabilized flow rate on flowmeter, and record rate in square Q6 of chart A.
- Calculate Q5-Q6 = QE, and compare result with maximum value given in chart D. If result is greater than maximum value, refer to ACTION column of chart D.

(9) Measure Flow Rate Q7

(a) Prepare

(a1) PFCUs
- No action

(a2) Relay jacks
- No action

(a3) Air intakes
- No action

(a4) Droop nose/visor
- No action

(a5) Artificial feel
- No action

(a6) Braking
- Depress pedals

(a7) Nose wheel steering
- No action

(a8) Landing gear
- No action

(b) Measure
- Read stabilized flow rate on flowmeter, and record rate in square Q7 of chart A.

- Calculate Q7-Q6 = QF, and compare result with maximum value given in chart D.
  If result is greater than maximum value, refer to ACTION column of chart D.

(10) Measure Flow Rate Q8

(a) Prepare

(a1) PFCUs
- No action

(a2) Relay jacks
- No action

(a3) Air intakes
- No action

(a4) Droop nose/visor
- No action

(a5) Artificial feel
- No action

(a6) Braking
- Release pedals

(a7) Nose wheel steering
- Install safety key C22646 (in interphone box on nose gear leg).

(a8) Landing gear
- No action

(b) Measure
- Read stabilized flow rate on flowmeter, and record rate in square Q8 of chart A.
- Calculate Q6-Q8 = QG, and compare result with maximum value given in chart D.
  If result is greater than maximum value, refer to ACTION column of chart D.

(11) Measure Flow Rate Q9

(a) Prepare

(a1) PFCUs
- No action

(a2) Relay jacks
- No action

(a3) Air intakes
- No action

(a4) Droop nose/visor
- No action

(a5) Artificial feel
- No action

(a6) Braking
- No action

(a7) Nose wheel steering
- Remove safety key C22646 from interphone box on nose gear leg.

(a8) Landing gear
- Retract landing gear (Ref. 32-31-00, Adjustment/Test, Landing Gear Retraction Manoeuvre).

(b) Measure
- Read stabilized flow rate on flowmeter and record rate in square Q9 of chart A.
- Calculate Q9-Q8 = QH, and compare result with maximum value given in chart D.
  If result is greater than maximum value, refer to ACTION column of chart D.

C. Internal Leakage Tests : Blue System
(Ref. Fig. 602)

(1) Equipment and Materials

DESCRIPTION	PART NO.
Ground Power Unit - Hydraulic - Power and Preliminary Testing	EMH 398E
Access Platform	
Flowmeter Capable of 99,5% to 99.7% Precision Within a Range of 0.5 to 25 l/min.	
Electrical Ground Power Unit	

(2) Prepare

(a) Make certain that the following circuit breakers are set :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
NOSE UC WEIGHT SW "A" SYS SUP	1-213	G 291	M16
LH UC WEIGHT SW "A" SYS SUP		G 292	M17
RH UC WEIGHT SW & DOWNLOCK "B" SYS SUP		G 295	M18
UC POSN IND		G 51	N16
LH UC WEIGHT SW & DOWNLOCK "B" SYS SUP	3-213	G 293	B 8
NOSE W/C W/SW "B" SYS SUP		G 296	D 8
UC RAISE DOORS CLOSE UP	15-215	G 1	A 6
UC SELECTOR RAISE CONT		G 2	A 7
UC LOWER DOORS OPEN SUP		G 3	A 8
UC SELECTOR LOWER CONT		G 4	A 9

(b) Connect hydraulic ground power unit to Blue system ground connectors (Ref. 29-12-00, Servicing). Install a flowmeter between ground power unit and delivery ground connector.

(c) Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing).

(d) Pressurize Blue system (Ref. 29-12-00, Servicing).

(e) On overhead panel :
On Flight Control Unit, place BLUE INVERTER and GREEN INVERTER switches in ON position.
Check that O & M ELEVONS, IN ELEVONS and RUDDER switches are in MECH position.

(3) Measure Flow Rate Q20

(a) Prepare

(a1) PFCUs
On overhead panel

CMA 29 00 00 6 ACM0

SERVICES	CONFIGURATION (3)	(4)	(5)	(6)	(7)
PFCU'S (a1)	HYD PWR : NORMAL BLUE ELECTRICAL MODE	HYD PWR : GREEN ONLY	→	→	→
RELAY JACKS (a2)	HYD PWR : BLUE ONLY AP1 ENGAGED	→	GREEN ONLY	→	→
AIR INTAKES (a3)	AUTO	→	→	MAN	→
ARTIFICIAL FEEL No. 1 (PITCH, ROLL, YAW) (a4)	ON (ADC1 ON)	→	→	→	OFF
STABILIZED FLOW RATE READ ON FLOWMETER	Q20 =	Q21 =	Q22 =	Q23 =	Q24 =
		Q20-Q21=QI	Q21-Q22=QJ	Q22-Q23=QK	Q23-Q24-QL

Chart B
Internal Leakage Tests : Blue System
Figure 602

EFFECTIVITY: ALL

R BA

- on SERVO CONTROLS unit, place selector switches in NORMAL. Check that BLUE L. PRESS caption light is off, and that GREEN L. PRESS caption light is on.
- place O & M ELEVONS, IN ELEVONS and RUDDER switches in BLUE position and press associated RESET push buttons.

On First Officer's instrument panel, at ICOVOL indicator, check that the eight magnetic indicators display B.

(a2) Relay jack
- On overhead panel, RELAY JACK unit, place switch in BLUE ONLY position.
- Engage auto pilot 1 (Ref. 22-10-00, Servicing, AP 1 Engagement).

(a3) Air intake
- On Flight Engineer's AIR INTAKES panel, check that RAMP SPILL MASTER switches are in AUTO position.

(a4) Artificial feel
- On centre console, ADC control panel, place ADC 1 switch in ON position, and test selector switch in NORM position. If amber ADC 1 warning light is on, press then release to extinguish.
- On overhead panel, ARTIFICIAL FEEL No.1 engage switch unit, engage PITCH, ROLL and YAW switches.

(b) Measure
- Read stabilized flow rate on flowmeter, and record rate in square Q20 of chart B.

(4) Measure Flow Rate Q21

(a) Prepare

(a1) PFCUs
- On overhead panel, SERVO CONTROLS unit, place upper selector switch in GREEN ONLY position. Check that BLUE L. PRESS caption light comes on.
- On First Officer's instrument panel, ICOVOL indicator, check that the eight magnetic indicators display M.
- On master warning panel, cancel PFC warning.

(a2) Relay jack
- No action

(a3) Air intake
- No action

(a4) Artificial feel
- No action

(b) Measure
- Read stabilized flow rate on flowmeter and record rate in square Q21 of chart B.
- Calculate Q20-Q21 = QI, and compare result with maximum value given in chart D.
If result is greater than maximum value, refer to ACTION column of chart D.

(5) Measure Flow Rate Q22

(a) Prepare

(a1) PFCUs
- No action

(a2) Relay jacks
- On overhead panel, RELAY JACK unit, place switch in GREEN ONLY position.

(a3) Air intakes
- No action

(a4) Artificial feel
- No action

(b) Measure
- Read stabilized flow rate on flowmeter, and record rate in square Q22 of chart B.
- Calculate Q21-Q22 = QJ, and compare result with maximum value given in chart D.
If result is greater than maximum value, refer to ACTION column of chart D.

(6) Measure Flow Rate Q23

(a) Prepare

(a1) PFCUs
- No action

(a2) Relay jacks
- No action

(a3) Air intakes
- On Flight Engineer's AIR INTAKES panel, place RAMP SPILL MASTER switches in MAN position (engine 3 air intake).

(a4) Artificial feel
- No action

(b) Measure
- Read stabilized flow rate on flowmeter, and record rate in square Q23 of chart B.
- Calculate Q22-Q23 = QK, and compare result with maximum value given in chart D.
If result is greater than maximum value, refer to ACTION column of chart D.

(7) Measure Flow Rate Q24

(a) Prepare

(a1) PFCUs
- No action

(a2) Relay jacks
- No action

(a3) Air intakes
- No action

(a4) Artificial feel
- On centre console, ADC control panel, place ADC 1 switch in OFF position.
- On overhead panel, ARTIFICIAL FEEL No.1 engage switch unit, PITCH, ROLL and YAW switches should disengage.

(b) Measure
- Read stabilized flow rate on flowmeter, and record rate in square Q24 of chart B.
- Calculate Q23-Q24 = QL, and compare result with maximum value given in chart D.
If result is greater than maximum value, refer to ACTION column of chart D.

D. Internal Leakage Tests : Yellow System
(Ref. Fig. 603)

(1) Equipment and Materials

DESCRIPTION	PART NO.
Ground Power Unit - Hydraulic - Power and Preliminary Testing	EMH 398E
Access Platform	
Flowmeter, Capable of 99.5% to 99,7% Precision Within a Range of 0.5 to 25 l/min.	
Electrical Ground Power Unit	

(2) Prepare

(a) Make certain that the following circuit breakers are set :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
NOSE UC WEIGHT SW "A" SYS SUP	1-213	G 291	M16
LH UC WEIGHT SW & DOWN-LOCK SYS SUP		G 292	M18
RH UC WEIGHT SW & DOWN-LOCK "A" SYS SUP		G 295	M18
UC POSN IND		G 51	N16
LH UC WEIGHT SW & DOWN-LOCK "B" SYS SUP	3-213	G 293	B 8
RH UC WEIGHT SW "B" SYS SUP		G 294	B 9
NOSE W/C W/SW "B" SYS SUP		C 296	D 8
UC RAISE DOORS CLOSE UP	15-215	G 1	A 6
UC SELECTOR RAISE CONT		G 2	A 7
UC LOWER DOORS OPEN SUP		G 3	A 8
UC SELECTOR LOWER CONT		G 4	A 9
EMER BRAKE PRESS IND	2-213	G 112	E15
PLTS LT TEST SUP	12-215	L1001	E14
BRAKE ACCUM PRESS IND	13-216	G 111	A12

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
WHEELS BRAKES "B" SYS CONT	15-216	G 132	B18
BRAKE EMER/ACCUM PRESS IND	25-216	G 118	C 6
BRAKE EMER/ACCUM/WATER PIPE 4TR CONT		G 119	B 7

(b) Connect hydraulic ground power unit to Yellow system ground connectors (Ref. 29-21-00, Servicing). Install a flowmeter between ground power unit and delivery ground connector.

(c) Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing).

(d) Pressurize Yellow system (Ref. 29-21-00, Servicing).

(e) On overhead panel
- On Flight Control Unit, place BLUE INVERTER and GREEN INVERTER switches in ON position. Check that O & M ELEVONS, IN ELEVONS and RUDDER switches are in MECH position.

(3) Measure Flow Rate Q30

(a) Prepare

(a1) PFCUs
On overhead panel
- on SERVO CONTROLS unit, place selector switches in YELLOW GREEN. Check that green indicator lights (PFCU standby selector valve solenoid power supply) come on.
- place O & M ELEVONS, IN ELEVONS and RUDDER switch in GREEN position, and press associated RESET push buttons.

On First Officer's instrument panel, at ICOVOL indicator, check that the eight magnetic indicators display G.

CMA 29 00 00 6 AEMO

SERVICES	CONFIGURATION (3)	(4)	(5)	(6)
PFCU'S (a1)	HYD PWR : YELLOW GREEN OR YELLOW BLUE BLUE OR GREEN ELECTRICAL MODE →	→	→	
RELAY JACKS (a2)	BLUE AND GREEN →	→	→	
AIR INTAKES (a3)	MAN HYD SELECTOR SWITCH IN YELLOW POSITION	RAMP INCHING SWITCHES HELD IN "LOWER"	RAMP INCHING SWITCHES RELEASED	
EMERGENCY BRAKING (a4)	BRAKE SELECTOR LEVER IN " EMERG" POSITION →		PEDALS DEPRESSED	PEDALS RELEASED
LANDING GEAR (a5)	LANDING GEAR EXTENDED (EMERGENCY) →	→		LG & DOOR EMERG CONTROL LEVER IN NEUTRAL
STABILIZED FLOW RATE READ ON FLOWMETER	Q30 =	Q31 =	Q32 =	Q33 =
		Q31-Q30 = QO	Q32-Q30 = QP	Q30-Q33 = QQ

Chart C
Internal Leakage Tests : Yellow System
Figure 603

EFFECTIVITY: ALL

R BA

Printed in England

(a2) Relay jack
- On overhead panel, RELAY JACK unit, place switch in NORM position.
- Engage auto pilot No.2 (Ref. 22-10-00, Servicing, AP 2 Engagement).

(a3) Air intakes
- On Flight Engineer's AIR INTAKES panel, check that RAMP SPILL MASTER switches are in MAN position.
  Check that hydraulic selector switches are in YELLOW position.

(a4) Emergency braking
- On centre console, check that brake selector lever is in EMERG position.

(a5) Landing gear
- Place landing gear and door emergency control lever in DOORS, then WHEELS position ; and landing gear normal control lever in DOWN position.

(b) Measure
- Read stabilized flow rate on flowmeter and record rate in square Q30 of chart C.

(4) Measure Flow Rate Q31

(a) Prepare

(a1) PFCUs
- No action

(a2) Relay jacks
- No action

(a3) Air intakes
- Place and hold RAMP inching switches in LOWER position.

(a4) Emergency braking
- No action

(a5) Landing gear
- No action

(b) Measure
- Read stabilized flow rate on flowmeter and record rate in square Q31 of chart C.
- Calculate Q31-Q30 = Q0 and compare result with

maximum value given in chart D.
If result is greater than maximum value, refer to ACTION column of chart D.

(5) Measure Flow Rate Q32

(a) Prepare

(a1) PFCUs
- No action

(a2) Relay jacks
- No action

(a3) Air intakes
- Release RAMP inching switches.

(a4) Emergency braking
- Hold pedals depressed

(a5) Landing gear
- No action

(b) Measure
- Read stabilized flow rate on flowmeter, and record rate in square Q32 of chart C.
- Calculate Q32-Q30 = QP, and compare result with maximum value given in chart D.
If result is greater than maximum value, refer to ACTION column of chart D.

(6) Measure Flow Rate Q33

(a) Prepare

(a1) PFCUs
- No action

(a2) Relay jacks
- No action

(a3) Air intakes
- No action

(a4) Emergency braking
- Release pedals

(a5) Landing gear
- Landing gear and door emergency control lever in NEUTRAL position.

(b) Measure
- Read stabilized flow rate on flowmeter, and record rate in square Q33 of chart C.
- Calculate Q30-Q33 = QQ, and compare result with maximum value given in chart D.
  If result is greater than maximum value, refer to ACTION column of chart D.

E. Maximum Leakage Rates and Special Procedures

The following tables list :
- The maximum leakage rates allowed for the various services
- The procedures to follow according to whether the leakage rate read is above or below maximum allowed.

(Ref. Fig. 604, 605 and 606)
(Ref. Fig. 607, 608 and 609)
(Ref. Fig. 610, 611 and 612)
(Ref. Fig. 613, 614 and 615)
(Ref. Fig. 616)

F. Service Leakage Rate Measurement Procedures

The following charts detail instructions for testing the various components for internal leakage.

(Ref. Fig. 617, 618 and 619)
(Ref. Fig. 620, 621 and 622)
(Ref. Fig. 623, 624 and 625)
(Ref. Fig. 626, 627 and 628)
(Ref. Fig. 629)

Printed in England

SERVICES	LEAKAGE RATE	DESCRIPTION	MAX. LEAKAGE RATE CC/MIN	LEAKAGE RATE BELOW	LEAKAGE RATE ABOVE	ACTION
PFCU'S	QA	LEAKAGE RATE, PFCU'S IN GREEN ELECTRICAL MODE	12800	X		NONE
					X	MEASURE PFCU SV LEAKAGE RATE (REF CHART E)
	Q. MOSV	LEAKAGE RATE OF THE 4 MOSV'S (MIDDLE, OUTER SERVO VALVES)	2400	X		NO ACTION ON THESE SV'S MEASURE Q. ISV REF NOTE
					X	ISOLATE LEAKAGE BETWEEN THE 4 SV'S REPLACE FAULTY ITEM. MEASURE Q. ISV
	Q. ISV	LEAKAGE RATE OF THE 2 ISV'S (INNER SERVO VALVES)	1200	X		NO ACTION ON THESE SV'S MEASURE Q. YSV REF NOTE
					X	ISOLATE LEAKAGE BETWEEN THE 2 SV'S REPLACE FAULTY ITEM MEASURE Q. YSV
	Q. YSV	LEAKAGE RATE OF THE 2 YSV'S (YAW SERVO VALVES)	1200	X		NO ACTION ON THESE SV'S
					X	ISOLATE LEAKAGE BETWEEN THE 2 SV'S REPLACE FAULTY ITEM.

CMA 29 00 00 6 AGMO

Chart D, Sheet 1 of 13
Maximum Leakage Rates and Special Procedures
Figure 604

NOTE : IF QA IS ABOVE 12800 CC/MIN, AND Q.OMSV + Q.ISV + Q.YSV BELOW 4800 CC LEAKAGE IS NOT FROM THE SERVO VALVES. IDENTIFY AND REPLACE THE FAULTY PFCU.

RELAY JACKS	QB	LEAKAGE RATE, RELAY JACKS IN ELECTRICAL MODE	3600	X		NONE
					X	MEASURE LEAKAGE RATE OF THE 3 RELAY JACK SV'S. (REF CHART F)
	Q.RJSV	LEAKAGE RATE OF RELAY JACK SV'S	1800	X		LEAKAGE NOT FROM SV'S. REPLACE FAULTY RELAY JACK
					X	ISOLATE LEAKAGE BETWEEN 3 RELAY JACK SV'S. REPLACE FAULTY ITEM.
AIR INTAKES	QC	LEAKAGE RATE, SPILL DOORS 1 AND 2, AND RAMPS 1 AND 2, GREEN SYSTEM	3800	X		NONE
					X	MEASURE LEAKAGE RATE AT EACH SPILL DOOR AND EACH RAMP (REF CHART H)
	Q.RA1	LEAKAGE RATE, RAMP 1	1000			NO ACTION ON THIS RAMP. MEASURE LEAKAGE RATE AT RAMP 2

CMA 29 00 0 6 AJMO

Chart D, Sheet 2 of 13
Maximum Leakage Rates and Special Procedures
Figure 605

					X	REPLACE RAMP 1. MEASURE LEAKAGE AT RAMP 2.
	Q. RA2	LEAKAGE RATE, RAMP 2	1000	X		NO ACTION ON THIS RAMP. MEASURE LEAKAGE RATE AT SPILL DOOR 1.
					X	REPLACE RAMP 2. MEASURE LEAKAGE AT SPILL DOOR 1.
	Q. SD1	LEAKAGE RATE, SPILL DOOR 1	900	X		NO ACTION ON THIS SPILL DOOR. MEASURE LEAKAGE AT SPILL DOOR 2.
					X	REPLACE SPILL DOOR 1. MEASURE LEAKAGE AT SPILL DOOR 2.
	Q. SD2	LEAKAGE RATE, SPILL DOOR 2	900	X		NO ACTION ON THIS SPILL DOOR
					X	REPLACE SPILL DOOR 2.
DROOP NOSE, VISOR	QD	LEAKAGE RATE OF DROOP NOSE/VISOR SYSTEM IN "NOSE/VISOR DOWNLOCKED" CONFIGURATION	1000	X		NONE
		FAULTY ITEMS : - VISOR UPLOCK JACK - VISOR JACK - DROOP NOSE UPLOCK SELECTOR VALVE.			X	IDENTIFY AND REPLACE FAULTY ITEMS. IF REQUIRED REF. Q.D1 AND QN 7.5 BELOW.

CMA 29 00 00 6 ALMO

Chart D, Sheet 3 of 13
Maximum Leakage Rates and Special Procedures
Figure 606

Printed in England

		QD1 LEAKAGE RATE BETWEEN CHAMBERS OF DROOP NOSE ACTUATOR 5 DEG. AND 7.5 DEG. JACKS NOSE UP, VISOR DOWN CONFIGURATION FOR THE OTHER SERVICES, PREPARATION SAME AS IN PARA. 9B, COLUMN 7 OF CHART A. QDH-Q4 = QD1	8000	X		NONE
					X	MEASURE LEAKAGE RATE OF 7.5 DEG. JACKS (REF. CHART G)
		QN 7.5 LEAKAGE RATE BETWEEN CHAMBERS OF DROOP NOSE ACTUATOR 7.5 DEG. JACKS (REF. CHART G)	3500	X		IDENTIFY 5 DEG JACK AFFECTED AND REPLACE
					X	IDENTIFY 7.5 DEG. JACK AFFECTED AND REPLACE.
ARTIFICIAL FEEL	QE	LEAKAGE RATE, YAW, PITCH AND ROLL ARTIFICIAL FEEL, GREEN SYSTEM	2400	X		NONE
					X	MEASURE LEAKAGE RATE IN YAW, PITCH AND ROLL (REF CHART J)
	Q.YAF	LEAKAGE RATE, YAW ARTIFICIAL FEEL	800	X		NO ACTION ON THIS SYSTEM MEASURE PITCH LEAKAGE RATE
					X	REPLACE YAW AF JACKS MEASURE PITCH LEAKAGE RATE

CMA 29 00 00 6 ANMO

Chart D, Sheet 4 of 13
Maximum Leakage Rates and Special Procedures
Figure 607

Printed in England

	Q.PAF	LEAKAGE RATE, PITCH ARTIFICIAL FEEL	800	X		NO ACTION ON THIS SYSTEM. MEASURE ROLL LEAKAGE RATE.
					X	REPLACE PITCH AF JACK. MEASURE ROLL LEAKAGE RATE.
	Q.RAF	LEAKAGE RATE, ROLL ARTIFICIAL FEEL	800	X		NO ACTION ON THIS SYSTEM.
					X	REPLACE ROLL AF JACK.
NORMAL BRAKING	QF	LEAKAGE RATE, NORMAL BRAKING SYSTEM	10000	X		NONE
					X	ISOLATE INTERNAL LEAKAGE. REPLACE FAULTY COMPONENT (REF. CHART K).
	Q.RB	LEAKAGE RATE, BRAKING SYSTEM, RH SIDE DOWNSTREAM OF SERVO VALVES : TWO BOGIE BEAM SWIVEL JOINTS	150	X		NO ACTION ON THIS PART OF SYSTEM. MEASURE Q.LB.
					X	ISOLATE INTERNAL LEAKAGE. REPLACE FAULTY COMPONENT. MEASURE Q.LB.
	Q.LB	LEAKAGE RATE, BRAKING SYSTEM, LH SIDE DOWNSTREAM OF SERVO VALVES : TWO BOGIE BEAM SWIVEL JOINTS.	150	X		NO ACTION ON THIS PART OF SYSTEM.
					X	ISOLATE INTERNAL LEAK. REPLACE FAULTY ITEM.

CMA 29 00 00 6 AQMO

Chart D, Sheet 5 of 13
Maximum Leakage Rates and Special Procedures
Figure 608

NOSE WHEEL STEERING	QG	LEAKAGE RATE, NOSE WHEEL STEERING SYSTEM	3000	X		NONE
					X	REPLACE FAULTY ITEM.
LANDING GEAR	QH	LEAKAGE RATE, LANDING GEAR RETRACTION SYSTEM	500	X		NONE
					X	ISOLATE INTERNAL LEAK. REPLACE FAULTY ITEM.
	Q9	LEAKAGE RATE, RAT HEATING SYSTEM. PERMANENT LEAKAGE PUMP DELIVERY LINE RESTRICTOR. LEAKAGE RATE, ISOLATING COMPONENTS.	3500	X		NONE
					X	ISOLATE MAJOR LEAK. REPLACE FAULTY ITEM.
PFCU'S	QI	LEAKAGE RATE, PFCUS IN BLUE ELECTRICAL MODE	12800	X		NONE
					X	MEASURE PFCU SV LEAKAGE RATE (REF. CHART L)
	Q.MOSV	LEAKAGE RATE OF THE FOUR MOSV'S (MIDDLE, OUTER SERVO VALVES)	2400	X		NO ACTION ON THESE SV'S MEASURE Q.ISV
					X	ISOLATE LEAKAGE BETWEEN THE 4 SV'S. REPLACE FAULTY ITEM. MEASURE Q.ISV.

CMA 29 00 00 6 ASMO

Chart D, Sheet 6 of 13
Maximum Leakage Rates and Special Procedures
Figure 609

	Q.ISV	LEAKAGE RATE OF THE TWO ISV'S (INNER SERVO VALVES)	1200	X		NO ACTION ON THESE SV'S. MEASURE Q.YSV
					X	ISOLATE LEAKAGE BETWEEN THE TWO SV'S. REPLACE FAULTY ITEM. MEASURE Q.YSV
	Q.YSV	LEAKAGE RATE OF THE 2 YSV'S (YAW SERVO VALVES)	1200	X		NO ACTION ON THESE SV'S
					X	ISOLATE LEAKAGE BETWEEN THE 2 SV'S REPLACE FAULTY ITEM.
NOTE : If. QI IS ABOVE 12800 CC/MIN AND Q.OMSV + Q.ISV + Q.YSV BELOW 4800 CC, LEAKAGE IS NOT FROM THE SERVO VALVES. IDENTIFY AND REPLACE THE FAULTY PFCU.						
RELAY JACKS	QJ	LEAKAGE RATE, RELAY JACKS IN BLUE ELECTRICAL MODE	3600	X		NONE
					X	MEASURE LEAKAGE RATE OF THE 3 RELAY JACK SV'S (REF. CHART M)
	Q.RJSV	LEAKAGE RATE OF RELAY JACK SV'S	1800	X		LEAKAGE NOT FROM SERVO VALVES. REPLACE FAULTY RELAY JACK.

CMA 29 00 00 6 AUMO

Chart D, Sheet 7 of 13
Maximum Leakage Rates and Special Procedures
Figure 610

					X	ISOLATE LEAKAGE BETWEEN 3 RELAY JACK SV'S REPLACE FAULTY ITEM
AIR INTAKES	QK	LEAKAGE RATE, SPILL DOORS 3 AND 4, RAMPS 3 AND 4, BLUE SYSTEM	3800	X		NONE
					X	MEASURE LEAKAGE RATE AT EACH SPILL DOOR AND EACH RAMP (REF. CHART N)
	Q. RA3	LEAKAGE RATE, RAMP 3	1000	X		NO ACTION ON THIS RAMP. MEASURE LEAKAGE RATE AT RAMP 4
					X	REPLACE RAMP 3 MEASURE LEAKAGE RATE AT RAMP 4
	Q. RA4	LEAKAGE RATE, RAMP 4	1000	X		NO ACTION ON THIS RAMP MEASURE LEAKAGE RATE AT SPILL DOOR 3
					X	REPLACE RAMP 4 MEASURE LEAKAGE RATE AT SPILL DOOR 3

CMA 29 00 00 6 AWMO

Chart D, Sheet 8 of 13
Maximum Leakage Rates and Special Procedures
Figure 611

	Q.SD3	LEAKAGE RATE, SPILL DOOR 3	900	X		NO ACTION ON THIS SPILL DOOR. MEASURE LEAKAGE AT SPILL DOOR 4.
					X	REPLACE SPILL DOOR 3. MEASURE LEAKAGE RATE AT SPILL DOOR 4.
	Q.SD4	LEAKAGE RATE, SPILL DOOR 4	900	X		NO ACTION ON THIS SPILL DOOR.
					X	REPLACE SPILL DOOR 4
ARTIFICIAL FEEL	QL	LEAKAGE RATE, YAW, PITCH AND ROLL ARTIFICIAL FEEL, BLUE SYSTEM	2400	X		NONE
					X	MEASURE LEAKAGE RATE IN YAW, PITCH AND ROLL (REF. CHART P)
	Q. YAF	LEAKAGE RATE, YAW ARTIFICIAL FEEL	800	X		NO ACTION ON THIS SYSTEM. MEASURE PITCH LEAKAGE RATE.
					X	REPLACE YAW AF JACKS. MEASURE PITCH LEAKAGE RATE.

CMA 29 00 00 6 AYMO

Chart D, Sheet 9 of 13
Maximum Leakage Rates and Special Procedures
Figure 612

	Q.PAF	LEAKAGE RATE, PITCH ARTIFICIAL FEEL	800	X		NO ACTION ON THIS SYSTEM MEASURE ROLL LEAKAGE RATE
					X	REPLACE PITCH AF JACK. MEASURE ROLL LEAKAGE RATE
	Q.RAF	LEAKAGE RATE, ROLL ARTIFICIAL FEEL	800	X		NO ACTION ON THIS SYSTEM
					X	REPLACE ROLL AF JACK.
	Q.24	PERMANENT LEAKAGE, PUMP DELIVERY LINE RESTRICTOR LEAKAGE RATE, ISOLATING COMPONENTS	2000	X		NONE
					X	ISOLATE MAJOR LEAK REPLACE FAULTY ITEM
AIR INTAKES	Q0	LEAKAGE RATE, AIR INTAKE RAMPS STANDBY SYSTEM	4000	X		NONE
						MEASURE LEAKAGE RATE OF EACH PUMP (REF. CHART Q)

CMA 29 00 00 6 BAMO

Chart D, Sheet 10 of 13
Maximum Leakage Rates and Special Procedures
Figure 613

	Q. RA1	LEAKAGE RATE, ENG1 RAMP, STANDBY	1000	X		NO ACTION ON THIS RAMP. MEASURE LEAKAGE RATE AT RAMP 2.
					X	REPLACE ENG1 RAMP. MEASURE LEAKAGE RATE AT RAMP 2
	Q. RA2	LEAKAGE RATE, ENG 2 RAMP, STANDBY	1000	X		NO ACTION ON THIS RAMP. MEASURE LEAKAGE RATE AT RAMP 3.
					X	REPLACE RAMP 2. MEASURE LEAKAGE RATE AT RAMP 3
	Q. RA3	LEAKAGE RATE, ENG 3 RAMP, STANDBY	1000	X		NO ACTION ON THIS RAMP. MEASURE LEAKAGE RATE AT RAMP 4
					X	REPLACE RAMP 3. MEASURE LEAKAGE RATE AT RAMP 4.
	Q. RA4	LEAKAGE RATE, ENG4 RAMP, STANDBY	1000	X		NO ACTION ON THIS RAMP.
					X	REPLACE RAMP 4.

CMA 29 00 00 6 BCMO

Chart D, Sheet 11 of 13
Maximum Leakage Rates and Special Procedures
Figure 614

	QP	LEAKAGE RATE, EMERGENCY BRAKING SYSTEM (WITHOUT ANTI-SKID)	500	X		NONE
					X	MEASURE LEAKAGE RATE LH AND RH LG BRAKING SYSTEM (REF. CHART R)
	Q. RB	LEAKAGE RATE, RH LG EMERG. BRAKING SYSTEM	150	X		NO ACTION ON RH LG SYSTEM MEASURE LEAKAGE RATE LH LG SYSTEM.
					X	ISOLATE INTERNAL LEAKAGE REPLACE FAULTY ITEM MEASURE LEAKAGE RATE LH LG
	Q. LB	LEAKAGE RATE, LH LG EMERG. BRAKING SYSTEM	150	X		NO ACTION ON LH LG SYSTEM.
						ISOLATE INTERNAL LEAKAGE REPLACE FAULTY ITEM.
LANDING GEAR	QQ	LEAKAGE RATE, LANDING GEAR EMERG EXTENSION	300	X		NONE
					X	MEASURE LEAKAGE RATE TAIL LG DOOR OPENING SYSTEM AND LG SYSTEM (REF. CHART S)

CMA 29 00 00 6 BLMO

Chart D, Sheet 12 of 13
Maximum Leakage Rates and Special Procedures
Figure 615

Printed in England

	Q.DS	LEAKAGE RATE, LG DOOR EMERGENCY SYSTEM	150	X		NO ACTION ON THIS SYSTEM. MEASURE LEAKAGE, LG EMERGENCY SYSTEM.
					X	ISOLATE MAJOR LEAK. REPLACE FAULTY ITEM. MEASURE LEAKAGE RATE, LG EMERGENCY SYSTEM
	Q.LGS	LEAKAGE RATE, LANDING GEAR EMERGENCY SYSTEM	150	X		NO ACTION ON THIS SYSTEM.
					X	ISOLATE MAJOR LEAK. REPLACE FAULTY ITEM.
	Q.33	PERMANENT LEAKAGE RATE, PUMP DELIVERY LINE RESTRICTOR. LEAKAGE RATE, ISOLATING COMPONENTS.	2500	X		NONE
					X	ISOLATE MAJOR LEAKAGE, REPLACE FAULTY ITEM.

CMA 29 00 00 6 BGMO

Chart D, Sheet 13 of 13
Maximum Leakage Rates and Special Procedures
Figure 616

COLUMN 1 : OUTER AND MIDDLE (OMSV)
COLUMN 2 : INNER (ISV)
COLUMN 3 : YAW (YSV)

SERVICES	CONFIGURATIONS		
	1	2	3
PFCU'S	ON OVERHEAD PANEL, "SERVO CONTROLS" UNIT SELECTOR SWITCHES IN NORMAL "O&M ELEVONS" SWITCH IN "MECH" "IN ELEVONS" AND "RUDDER" IN GREEN ICOVOL INDICATOR : ASSOCIATED MAGNETIC INDICATORS DISPLAY M AND G.	PREPARATION SAME AS IN COLUMN 1 BUT "IN ELEVONS" SWITCH IN "MECH."	PREPARATION SAME AS IN COLUMN 2 BUT "RUDDER" SWITCH IN "MECH."
RELAY JACKS AIR INTAKES DROOP NOSE/VISOR ARTIFICIAL FEEL BRAKING NOSE WHEEL STEERING LANDING GEAR	PREPARATION SAME AS IN PARAGRAPH 12B, CHART A, COLUMN 4	PREPARATION SAME AS IN PARAGRAPH 12.B CHART A, COLUMN 4	
STABILIZED FLOW RATE READ ON FLOWMETER	Q40	Q41	Q42
DETERMINE DIFFERENCE BETWEEN FOLLOWING RATES	Q1 -Q40 = Q.OMSV	Q40 -Q41 = Q.ISV	Q41 -Q42 = Q.YSV
MAX LEAKAGE RATES CC/MIN	Q.OMSV= 2400	Q.ISV = 1200	Q.YSV = 1200

CMA 29 00 00 6 BJM0

Chart E
PFCU Leakage Rates, Green System
Figure 617

RELAY JACKS	ON OVERHEAD PANEL, "RELAY JACK" UNIT. PLACE SWITCH IN "GREEN" ONLY POSITION. ENGAGE AUTO PILOT No. 2 (REF. 22-10-00, SERVICING AP 2 ENGAGEMENT).
PFCU'S AIR INTAKES DROOP NOSE/VISOR ARTIFICIAL FEEL BRAKING NOSE WHEEL STEERING LANDING GEAR	PREPARATION SAME AS IN PARAGRAPH 12B, CHART A, COLUMN 5.
STABILIZED FLOW RATE READ ON FLOWMETER	Q43
DETERMINE DIFFERENCE BETWEEN FOLLOWING RATES	Q2 - Q43 = Q. RJSV
MAX. LEAKAGE RATE, CC/MIN.	Q. RJSV = 1800

CMA 29 00 00 6 BLMO

Chart F
Relay Jack Leakage Rates, Green System
Figure 618

DROOP NOSE/VISOR	VISOR/NOSE SELECTOR SWITCH IN 5° POSITION
PFCU'S RELAY JACKS AIR INTAKES ARTIFICIAL FEEL BRAKING NOSE WHEEL STEERING LANDING GEAR	PREPARATION SAME AS IN PARAGRAPH 12.B, CHART A, COLUMN 7
STABILIZED FLOW RATE READ ON FLOWMETER	Q48
DETERMINE DIFFERENCE BETWEEN FOLLOWING RATES	Q5 - Q48 = QN 7°5
MAX. LEAKAGE RATE, CC/MIN.	3500

CMA 29 00 00 6 BNMO

Chart G
Droop Nose/Visor Leakage Rates, Green System
Figure 619

SERVICES	CONFIGURATION			
	1	2	3	4
AIR INTAKES	MANUAL CONTROL MODE. HYDRAULIC SELECTOR SWITCH : "GREEN" ENG 1 "RAMP" INCHING SWITCH HELD IN "LOWER"	MANUAL CONTROL MODE. HYDRAULIC SELECTOR SWITCH : "GREEN". ENG 1 "RAMP" INCHING SWITCH RELEASED. ENG 2 "RAMP" INCHING SWITCH HELD IN "LOWER"	MANUAL CONTROL MODE. HYDRAULIC SELECTOR SWITCH : "GREEN." ENG 2 "RAMP" INCHING SWITCH RELEASED ENG 1 "SPILL DOOR" INCHING SWITCH HELD IN "OPEN"	MANUAL CONTROL MODE. HYDRAULIC SELECTOR SWITCH : "GREEN." ENG 1 "SPILL DOOR" INCHING SWITCH RELEASED. ENG 2 "SPILL DOOR" INCHING SWITCH HELD IN "OPEN"
PFCU'S RELAY JACKS DROOP NOSE/VISOR ARTIFICIAL FEEL BRAKING NOSE WHEEL STEERING LANDING GEAR	PREPARATION SAME AS IN PARAGRAPH 12.B, CHART A, COLUMN 6.	PREPARATION SAME AS IN PARAGRAPH 12.B, CHART A, COLUMN 6.	PREPARATION SAME AS IN PARAGRAPH 12.B, CHART A, COLUMN 6.	PREPARATION SAME AS IN PARAGRAPH 12.B, CHART A, COLUMN 6.
STABILIZED FLOW RATE READ ON FLOWMETER	Q44	Q45	Q46	Q47
DETERMINE DIFFERENCE BETWEEN FOLLOWING RATES	Q44 - Q4 = Q.RA1	Q45 - Q4 = Q.RA2	Q46 - Q4 = Q.SD1	Q47 - Q4 = Q.SD2
MAX. LEAKAGE RATES CC/MIN	1000	1000	900	900

CMA 29 00 00 6 BQMIO

Chart H
Air Intake Leakage Rates, Green System
Figure 620

SERVICES	CONFIGURATION		
	1	2	3
ARTIFICIAL FEEL	YAW : SWITCH ENGAGED	YAW : ENGAGED PITCH : SWITCH ENGAGED	YAW : ENGAGED PITCH : ENGAGED ROLL : SWITCH ENGAGED
PFCU'S RELAY JACKS AIR INTAKES DROOP NOSE/VISOR BRAKING NOSE WHEEL STEERING LANDING GEAR	PREPARATION SAME AS IN PARAGRAPH 12.B, CHART A, COLUMN 8	PREPARATION SAME AS IN PARAGRAPH 12.B, CHART A, COLUMN 8	PREPARATION SAME AS IN PARAGRAPH 12.B, CHART A, COLUMN 8
STABILIZED FLOW RATE READ ON FLOWMETER	Q51	Q52	Q53
DETERMINE DIFFERENCE BETWEEN FOLLOWING RATES	Q51 -Q6 = Q. YAF	Q52 -Q51 = Q. PAF	Q53 -Q52 = Q. RAF
MAX. LEAKAGE RATES, CC/MIN	800	800	800

CMA 29 00 00 6 BSMO

Chart J
Artificial Feel Leakage Rates, Green System
Figure 621

SERVICES	CONFIGURATION	
	1	2
NORMAL BRAKING	DEPRESS LH PEDAL TO SECOND LOAD THRESHOLD.	LH PEDAL RELEASED. DEPRESS RH PEDAL TO SECOND LOAD THRESHOLD.
PFCU'S RELAY JACKS AIR INTAKES DROOP NOSE/VISOR ARTIFICIAL FEEL	PREPARATION SAME AS IN PARAGRAPH 12.B, CHART A, COLUMN 9.	PREPARATION SAME AS IN PARAGRAPH 12.B, CHART A, COLUMN 9.
STABILIZED FLOW RATE READ ON FLOWMETER	Q54	Q55
DETERMINE DIFFERENCE BETWEEN FOLLOWING RATES	Q7 -Q54 = Q.RB	Q7 -Q55 = Q.LB
MAX. LEAKAGE RATES, CC/MIN	150	150

CMA 29 00 00 0 BUMO

Chart K
Normal Braking System Leakage Rates
Figure 622

SERVICES	CONFIGURATION		
	1	2	3
PFCU'S	ON OVERHEAD PANEL, "SERVO CONTROLS" UNIT, SELECTOR SWITCH IN "BLUE ONLY" "O&M ELEVONS" SWITCH IN "MECH" "IN ELEVONS" AND "RUDDER" IN "BLUE". ICOVOL INDICATOR : ASSOCIATED MAGNETIC INDICATORS DISPLAY HAND B.	PREPARATION SAME AS IN COLUMN 1, BUT "IN ELEVONS" SWITCH IN "MECH".	PREPARATION SAME AS IN COLUMN 2, BUT "RUDDER" SWITCHES IN "MECH".
RELAY JACKS AIR INTAKES ARTIFICIAL FEEL	PREPARATION SAME AS IN PARAGRAPH 12.B, CHART A, COLUMN 4	PREPARATION SAME AS IN PARAGRAPH 12.B, CHART A, COLUMN 4	PREPARATION SAME AS IN PARAGRAPH 12.B, CHART A, COLUMN 4.
STABILIZED FLOW RATE READ ON FLOWMETER	Q56	Q57	Q58
DETERMINE DIFFERENCE BETWEEN FOLLOWING RATES	Q20 -Q56 = Q.OMSV	Q56 -Q57 = Q.ISV	Q57 -Q58 = Q.YSV
MAX. LEAKAGE RATES, CC/MIN	2400	1200	1200

CMA 29 00 00 6 BWMO

Chart L
PFCU Leakage Rates, Blue System
Figure 623

SERVICES	CONFIGURATIONS
RELAY JACKS	ON OVERHEAD PANEL, "RELAY JACK" UNIT, PLACE SWITCH IN "BLUE ONLY" POSITION. "O & M ELEVONS", "IN ELEVONS" AND "RUDDER" SWITCHES IN "MECH" POSITION. ICOVOL INDICATOR : ASSOCIATED MAGNETIC INDICATORS DISPLAY M.
PFCU'S AIR INTAKES ARTIFICIAL FEEL	PREPARATION SAME AS IN PARAGRAPH 12.B, CHART B, COLUMN 5.
STABILIZED FLOW RATE READ ON FLOWMETER	Q59
DETERMINE DIFFERENCE BETWEEN FOLLOWING RATES	Q21 -Q59 = Q. RJSV
MAX. LEAKAGE RATE, CC/MIN	1800

CMA 29 00 00 6 BYMO

Chart M
Relay Jack Leakage Rates, Blue System
Figure 624

SERVICES	CONFIGURATION			
	1	2	3	4
AIR INTAKES	MANUAL CONTROL MODE. HYDRAULIC SELECTOR SWITCH "BLUE". ENG 3 "RAMP" INCHING SWITCH HELD IN "LOWER"	MANUAL CONTROL MODE. HYDRAULIC SELECTOR SWITCH "BLUE" ENG 3 "RAMP" INCHING SWITCH RELEASED ENG 4 "RAMP" INCHING SWITCH HELD IN "LOWER"	MANUAL CONTROL / MODE HYDRAULIC SELECTOR SWITCH "BLUE" ENG 4 "RAMP" INCHING SWITCH RELEASED ENG 3 "SPILL DOOR" INCHING SWITCH HELD IN "OPEN"	MANUAL CONTROL MODE HYDRAULIC SELECTOR SWITCH "BLUE" ENG 3 "SPILL DOOR" INCHING SWITCH RELEASED ENG 4 "SPILL DOOR" INCHING SWITCH HELD IN "OPEN"
PFCU'S RELAY JACKS ARTIFICIAL FEEL	PREPARATION SAME AS IN PARAGRAPH 12.B CHART B COLUMN 6	PREPARATION SAME AS IN PARAGRAPH 12.B CHART B COLUMN 6	PREPARATION SAME AS IN PARAGRAPH 12.B CHART B COLUMN 6	PREPARATION SAME AS IN PARAGRAPH 12.B CHART B COLUMN 6
STABILIZED FLOW RATE READ ON FLOWMETER	Q60	Q61	Q62	Q63
DETERMINE DIFFERENCE BETWEEN FOLLOWING RATES	Q60 -Q23 = Q.RA3	Q61 -Q23 = Q.RA4	Q62 -Q23 = Q.SD3	Q63 -Q23 = Q.SD4
MAX. LEAKAGE RATES CC/MIN	1000	1000	900	900

CMA 29 00 00 6 CAMO

Chart N
Air Intake Leakage Rates, Blue System
Figure 625

SERVICES	CONFIGURATIONS 1	CONFIGURATIONS 2	CONFIGURATIONS 3
ARTIFICIAL FEEL	YAW SWITCH ENGAGED	YAW : ENGAGED PITCH : SWITCH ENGAGED	YAW : ENGAGED PITCH : ENGAGED ROLL : SWITCH ENGAGED
PFCU'S RELAY JACKS AIR INTAKES	PREPARATION SAME AS IN PARAGRAPH 12.B, CHART B, COLUMN 7	PREPARATION SAME AS IN PARAGRAPH 12.B, CHART B, COLUMN 7	PREPARATION SAME AS IN PARAGRAPH 12.B, CHART B, COLUMN 7
STABILIZED FLOW RATE READ ON FLOWMETER	Q64	Q65	Q66
DETERMINE DIFFERENCE BETWEEN FOLLOWING RATES	Q64 -Q24 = Q. YAF	Q65 -Q64 = Q. PAF	Q66 -Q65 = Q. RAF
MAX. LEAKAGE RATES, CC/MIN	800	800	800

CMA 29 00 00 6 CCM0

Chart P
Artificial Feel Leakage Rates, Blue System
Figure 626

SERVICES	CONFIGURATIONS			
	1	2	3	4
AIR INTAKES	MANUAL CONTROL MODE. ENG 1 "RAMP" INCHING SWITCH HELD IN "LOWER".	MANUAL CONTROL MODE. ENG 1 "RAMP" INCHING SWITCH RELEASED. ENG 2 "RAMP" INCHING SWITCH HELD IN "LOWER".	MANUAL CONTROL MODE. ENG 2 "RAMP" INCHING SWITCH RELEASED. ENG 3 "RAMP" INCHING SWITCH HELD IN "LOWER".	MANUAL CONTROL MODE. ENG 3 "RAMP" INCHING SWITCH RELEASED. ENG 4 "RAMP" INCHING SWITCH HELD IN "LOWER".
PFCU'S RELAY JACKS EMERGENCY BRAKING LANDING GEAR	PREPARATION SAME AS IN PARAGRAPH 12.B, CHART C, COLUMN 4.	PREPARATION SAME AS IN PARAGRAPH 12.B, CHART C, COLUMN 4.	PREPARATION SAME AS IN PARAGRAPH 12.B, CHART C, COLUMN 4	PREPARATION SAME AS IN PARAGRAPH 12.B, CHART C, COLUMN 4.
STABILIZED FLOW RATE READ ON FLOWMETER	Q67	Q68	Q69	Q70
DETERMINE DIFFERENCE BETWEEN FOLLOWING RATES	Q67 -Q30 = Q. RA1	Q68 -Q30 = Q. RA2	Q69 -Q30 = Q. RA3	Q70 -Q30 = Q. RA4
MAX. FLOW RATES, CC/MIN	1000	1000	1000	1000

CMA 29 00 00 6 CEMO

Chart Q
Air Intake Leakage Rates, Yellow System
Figure 627

SERVICES	CONFIGURATIONS 1	CONFIGURATIONS 2
EMERGENCY BRAKING	DEPRESS RH PEDAL TO SECOND LOAD THRESHOLD	RH PEDAL RELEASED. DEPRESS LH PEDAL TO SECOND LOAD THRESHOLD
PFCU'S RELAY JACKS EMERGENCY BRAKING	PREPARATION SAME AS IN PARAGRAPH 12.B, CHART C, COLUMN 5	PREPARATION SAME AS IN PARAGRAPH 12.B, CHART C, COLUMN 5
STABILIZED FLOW RATE READ ON FLOWMETER	Q71	Q72
DETERMINE DIFFERENCE BETWEEN FOLLOWING RATES	Q71 -Q30 = Q.RB	Q72 -Q30 = Q.LB
MAX. LEAKAGE RATES, CC/MIN	150	150

CMA 29 00 00 6 CGMO

Chart R
Emergency Braking System Leakage Rates
Figure 628

SERVICES	CONFIGURATIONS	
	1	2
LANDING GEAR	LANDING GEAR AND DOOR EMERGENCY CONTROL LEVER IN "DOORS" POSITION. NORMAL CONTROL LEVER IN "DOWN".	LANDING GEAR AND DOOR EMERGENCY CONTROL LEVER IN "WHEELS" POSITION. NORMAL CONTROL LEVER IN "DOWN".
PFCU'S RELAY JACKS AIR INTAKES EMERGENCY BRAKING	PREPARATION SAME AS IN PARAGRAPH 12.B, CHART C, COLUMN 6	PREPARATION SAME AS IN PARAGRAPH 12.B, CHART C, COLUMN 6
STABILIZED FLOW RATE READ ON FLOWMETER	Q73	Q74
DETERMINE DIFFERENCE BETWEEN FOLLOWING RATES	Q73 -Q33 = Q.DS	Q74 -Q73 = Q.LGS

CMA 29 00 00 6 CJMO

Chart S
LG Leakage Rates, Emergency Extension System
Figure 629

G. Close-Up

(1) Shut down Green hydraulic system power source (Ref. 29-11-00, Servicing).

(2) De-energize the aircraft electrical metwork and disconnect electrical ground power unit (Ref. 24-41-00, Servicing).

(3) Trip circuit breaker M691.

(4) Remove shorting jumper from plug.

(5) Set circuit breaker M691.

(6) Lower aircraft on to wheels (Ref. 07-11-00).

Printed in England

13. Delivery lines of engine-driven hydraulic pump low pressure switches

A. General

Engine-driven hydraulic pump low pressure switches are located in wing above engines.

B. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform	
Wing Protective Mat	
Warning Notice	

C. Prepare

(1) Position access platforms

(2) Display warning notices on engines 1, 2 and 3 prohibiting pressurization of hydraulic systems by hydraulic ground power unit

(3) Position wing protective mats and open the following access doors : 531AT, 532AT, 631AT and 632AT

D. Inspect/Check (Ref. Fig. 630)

(1) Check that hydraulic lines (1), (2), (3), (4), (5) and (6) do not foul structure or other lines. Make certain that hydraulic lines are free from peening and wear traces (at support clamps)

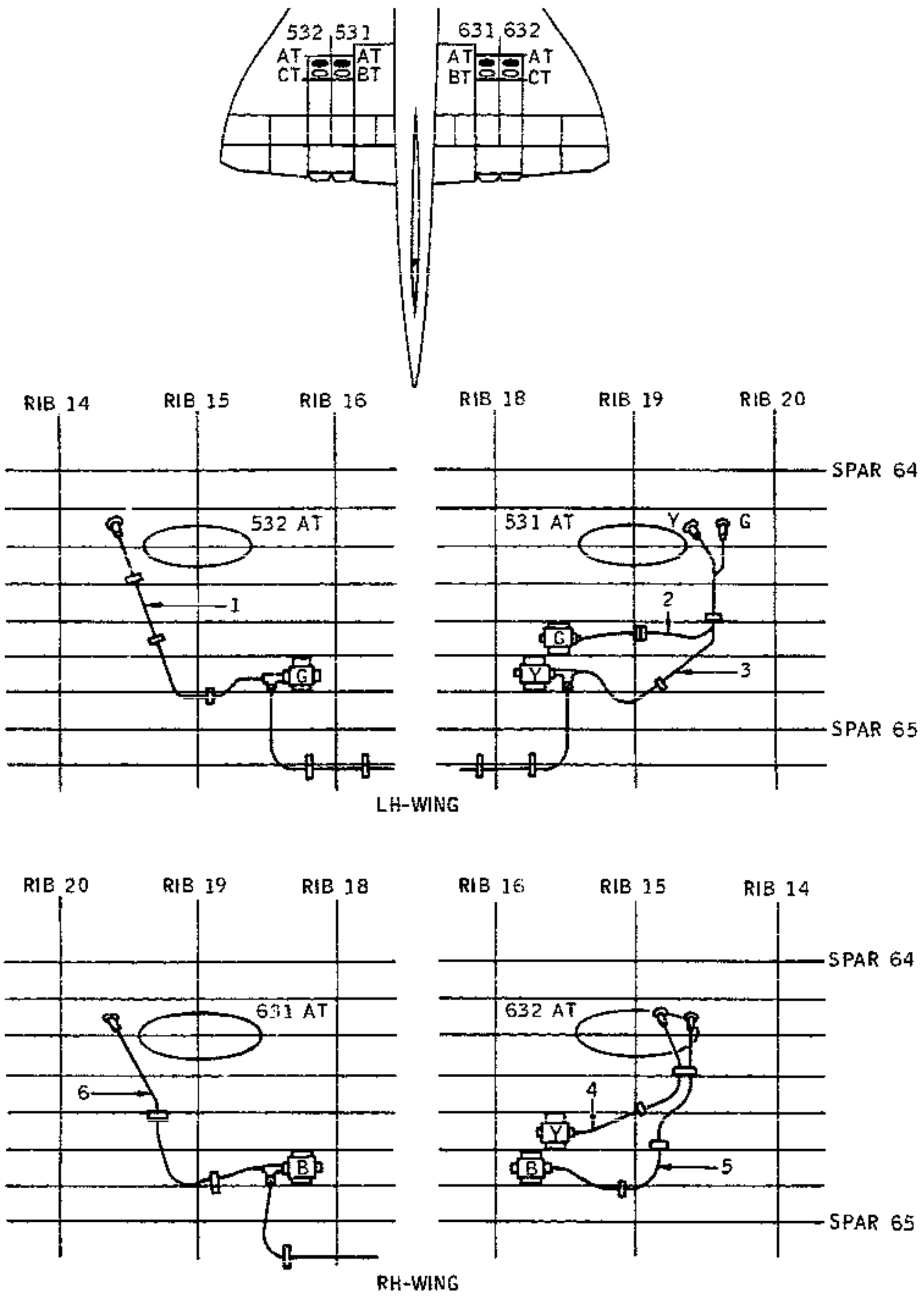
(2) Check that support clamps and clamp blocks are not broken and that there is no play between lines and support clamps or clamp blocks

E. Close-Up

(1) Close access doors

(2) Remove wing protective mats

(3) Remove access platforms and warning notices



CMA 29 00 00 6 CLMO

Delivery Lines of Engine-Driven Hydraulic Pump
Low Pressure Switches
Figure 630

R
B 14. Check Integrity of Yellow Hydraulic System

A. Equipment and Materials

DESCRIPTION	PART NO.
Ground Power Unit-Hydraulic-Power and Preliminary Testing	EMH 398E
Access Platform	-
Electrical Ground Power Unit	-

B. Prepare

(1) Make certain that the following circuit breakers are set:

	SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
	UC RAISE DOORS CLOSE SUP	15-215	G 1	A 6
	UC SELECTOR RAISE CONT		G 2	A 7
	UC LOWER DOORS OPEN SUP		G 3	A 8
	UC SELECTOR LOWER CONT		G 4	A 9
RB	WHEEL BRAKES YELLOW LL SHUT OFF		G 189	C 6
	VISOR & NOSE CONT		M 11	F 8
	UC POSN IND	1-213	G 51	N16
RB	WHEEL BRAKE 'A' SYS CONT O/LOAD IND		G 131	S16
RB	REAR OUTER WHEELS BRAKE CONT		G 183	S17
RB	FWD OUTER WHEELS BRAKE CONT		G 184	S18
	NOSE UC WEIGHT SW 'A' SYS SUP		G 291	M16
	LH UC WEIGHT SW 'A' SYS SUP		G 292	M17
	NOSE 7 1/2 DEG CONT		M 12	Q16
	NOSE/VISOR STBY LOWER SUP		M 13	Q17

PRINTED IN ENGLAND

	SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
RB	WHEELS 5 & 8 A/SKID & ADAPT AMPS SUP	2-213	G 185	A15
RB	WHEELS 6 & 7 A/SKID & ADAPT AMPS SUP		G 188	G15
RB	WHEEL BRAKE 'B' SYS CONT	3-213	G 132	D 9
	REAR INNER WHEELS BRAKE CONT		G 181	C 9
RB	FWD INNER WHEELS BRAKE CONT		G 182	C10
	RH UC WEIGHT SW 'B' SYS SUP		G 294	B 9
RB RB	WHEELS 1 & 4 A/SKID & ADAPT AMPS SUP	4-213	G 186	F10
RB RB	WHEELS 2 & 3 A/SKID & ADAPT AMPS SUP		G 187	A10

(2) Open access door 153 BB.

(3) Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing).

(4) Connect hydraulic ground power unit and pressurize Yellow hydraulic system (Ref. 29-21-00, Servicing).

C. Check

B NOTE: The integrity of Yellow hydraulic system is of prime importance and is only called upon after a failure of one of the main systems. Subsequent failure of Yellow system would increase flight crew activity turning a routine procedure into a potentially hazardous situation. For this reason it is imperative that any source of leakage or transfer of Yellow system is identified and rectification action taken.

B (1) At overhead panel SERVO CONTROLS unit, place lower selector switch in YELLOW BLUE position.

B (2) Set flight controls in Blue electrical mode (Ref. 27-00-00, Servicing).

B (3) Engage AP1 (Ref. 22-10-00, Servicing).

B (4) Air Intakes (Ref. 71-61-00, Adjustment/Test)

B (a) No.1 and No.2 intakes
- RAMP/SPILL MASTER switch to MAN
- Hydraulic selector to GREEN

R B (b) No 3 and No 4 intakes
R B - RAMP/SPILL MASTER switch to AUTO
R B - Hydraulic selector YELLOW

R B (5) Droop nose and visor (Ref. 27-61-00 p/b 500)
R B - using STANDBY lower nose and visor to NOSE DOWN
R B position.

R B CAUTION: ENSURE ADEQUATE OPERATING CLEARANCE FOR NOSE
R B PITOT HEAD.

R B (6) Place landing gear and door Emergency control lever in
R B 'DOORS' position.

R B (a) The nose gear and main gear doors open.

R B (b) On First Officer's instrument panel, on gears
R B position indicating unit, red lights corresponding
R B to green LH, nose and RH arrows illuminate.

R B - With doors open, place the door and gear Emergency
R B control lever in "WHEELS" position.

R B (7) Allow pressure to stabilize in systems for 10 minutes.

R B (8) Accurately note levels in Yellow, Green and Blue
R B hydraulic reservoirs.

R B (9) Depressurize Blue and Green hydraulic reservoirs
R B (Ref. 29-13-00, Servicing).

R B NOTE: This is to enhance any possible transfer of
R B hydraulic fluid into system return lines.

R B (10) On centre console, check that brake selector lever is
R B in 'NORM' position.

R B (11) Depress brake pedals and keep depressed for 15 minutes.

R B (12) Maintain this situation for a further 5 minutes.

R B (13) Pressurize Blue hydraulic reservoir (Ref. 29-13-00,
R B Servicing) then check level of Yellow hydraulic
R B reservoir.

R B - If level has dropped with a corresponding rise in
R B Blue reservoir carrying out a transfer check I.A.W.
R B 29-00-00 p/b 100.

R B - If level has dropped without a corresponding rise in
R B Blue reservoir check for external leakage (Ref.
R B item (17)).

R B (14) To confirm that there is no transfer of Yellow to Green
R B hydraulic system.

R B (a) At overhead panel SERVO CONTROLS unit, place lower
R B selector switch in YELLOW GREEN position.

PRINTED IN ENGLAND

(b) Set flight controls in Green electrical mode (Ref. 27-00-00, Servicing).

(c) Engage AP2 (Ref. 22-10-00, Servicing).

(d) Air intakes (Ref. 71-61-00, Adjustment/Test).

(d1) No.1 and No.2 intakes.
- RAMP/SPILL MASTER switch to AUTO.
- Hydraulic Selector to YELLOW.

(d2) No.3 and No.4 intakes.
- RAMP/SPILL MASTER switch to MAN.
- Hydraulic Selector to BLUE.

(15) Maintain this situation for 20 minutes.

(16) Pressurize Green hydraulic reservoir (Ref. 29-13-00, Servicing) then check level of Yellow hydraulic reservoir.

- If level has dropped with a corresponding rise in Green reservoir carry out a transfer check I.A.W. 29-00-00, Trouble Shooting.

R (17) Shut down pressurization of Yellow hydraulic system
R (Ref. 29-21-00, Servicing).

R (18) At overhead panel SERVO CONTROLS unit, place lower
R selector switch in NORMAL position.

R (19) Connect hydraulic ground power unit and pressurize
R Blue hydraulic system (Ref. 29-12-00, Servicing).

R NOTE: It is important to have Blue system
R pressurized before Yellow system is
R pressurized.

R (20) Pressurize Yellow hydraulic system (Ref. 29-21-00,
R Servicing).

R (21) Repeat sub items C.(1) to C.(12) inclusive, but do
R not depressurize Blue reservoir in sub item C.(9).

R (22) Check levels of the Yellow and Blue reservoirs. If
R transfer has occurred, shut down pressurization of
R Yellow and Blue hydraulic systems (Ref. 29-21-00 and
R 29-12-00, Servicing) and check the Relay Jacks Blue
R selector valve (Ref. 27-34-15, Adjustment/Test) and
R the PFCU Normal Blue selector valve (Ref. 27-34-51,
R Adjustment/Test) for electrical supply and correct
R operation.

R NOTE: Do not replace any components before trouble
R shooting.

R (23) Shut down pressurization of Yellow and Blue hydraulic systems (Ref. 29-21-00 and 29-12-00, Servicing).

R (24) At overhead panel SERVO CONTROLS unit, place lower selector switch in NORMAL position.

R (25) Connect hydraulic ground power unit and pressurize Green hydraulic system (Ref. 29-11-00, Servicing).

R NOTE: It is important to have Green system pressurized before Yellow system is pressurized.

R (26) Pressurize Yellow hydraulic system (Ref. 29-21-00, Servicing).

R (27) Repeat sub items C.(14) and C.(15).

R (28) Check the levels of the Yellow and Green hydraulic reservoirs. If transfer has occurred shut down pressurization of Yellow and Green hydraulic systems (Ref. 29-21-00 and 29-11-00, Servicing) and check the Relay Jacks Green selector valve (Ref. 27-34-15, Adjustment/Test) and the PFCU Normal Green selector valve (Ref. 27-34-51, Adjustment/Test) for electrical supply and correct operation.

R NOTE: Do not replace any components before trouble shooting.

R (29) If no indication of transfer from Yellow system to either of the two main systems during sub items C.(13), C.(16), C.(22) and C.(28), but Yellow reservoir level has dropped by more than 0.25 US gal, carry out an extensive inspection for external leakage.

R (30) The most probably areas of leakage are:

(a) Elevon and Rudder PFCUs. If any indication of leakage from drain holes remove access panels for closer inspection.

(b) Rear hydraulic bays, zones 151/152 and 153/154.

(c) Forward hydraulic bays, zones 123/124.

(d) Electric pump bays, zones 543/643 lower surface. Pay special attention to pipe expansion couplings, drip trays may need to be removed if leakage at underwing drain hole is noted.

PRINTED IN ENGLAND

(e) Inboard nacelle/wing fairings, zones 551/561. Any indication of leakage from drain holes, remove fairings and inspect plumbing with special attention to pipe expansion couplings.

(f) Intakes, zones 411, 421, 431 and 441.

- Filter bays with special attention to Yellow filters and spill door selectors.
- Ramp actuator standby motors and associated plumbing.

(g) Landing gear bays.

CAUTION: ANY INSPECTION CARRIED OUT WITHIN DOOR OPERATING RANGES, FIT DOOR JACK SAFETY COLLARS.

(h) Droop nose and visor bays, zone 113.

CAUTION: ANY INSPECTION CARRIED OUT IN ACCESS BAYS, FIT NOSE JACK LOCKING SLEEVES.

(31) All lower fuselage drain holes should be inspected for hydraulic leakage. Before obtaining access to most likely area of leakage confirm that fluid drainage is hydraulic and not fuel loss.

(32) Any leakage should be rectified and Yellow system integrity check repeated.

D. Close-Up

(1) Reset droop nose and visor after standby lowering (Ref. 27-61-00, Adjustment/Test).

RB (2) Reset standby lower lever and close landing gear doors
RB (Ref. 32-32-00, Adjustment/Test, para. 3.A. to 3.D.).

(3) Shut down pressurization and disconnect hydraulic ground power unit (Ref. 29-00-00, Servicing).

(4) If required, top up hydraulic reservoirs (Ref. 12-12-29).

(5) De-energize the aircraft electrical network and disconnect electrical ground power unit (Ref. 24-41-00, Servicing).

(6) Close or refit all access doors and panels removed to locate hydraulic leakage or transfer.

15. External Hydraulic Leakage Checks

WARNING: MAKE CERTAIN THAT THE POSITIONS OF NOSE AND MAIN GEAR DOORS CORRESPOND WITH THE ACTUAL POSITIONS OF THE RESPECTIVE OPERATING HANDLES.
HANDLE LOCKED, INDICATOR PLATE SHOWING WHITE: DOORS CLOSED.
HANDLE LOCKED, INDICATOR PLATE SHOWING RED: DOORS OPEN.

MAKE CERTAIN THAT THE LANDING GEAR POSITION INDICATED ON THE GEARS POSITION INDICATING UNIT CORRESPONDS WITH THE ACTUAL POSITION OF THE LANDING GEAR.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE, MAKE CERTAIN THAT THE TRAVEL RANGES OF THE CONTROL SURFACES ARE CLEAR.
BEFORE PRESSURIZING HYDRAULIC SYSTEMS, CHECK THAT ALL CONTROLS ARE SET TO CORRESPOND WITH THE ACTUAL POSITION OF THE SERVICES THEY OPERATE.

MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

A. General

Carry out a systematic inspection of aircraft for hydraulic system leakage in areas of known possible leakage.

B. Hydraulic Leakage Checks

(1) Equipment and Materials

DESCRIPTION	PART NO.
Access Platforms	-

(2) Prepare

(a) Take the precautions described in the previous WARNING paragraph.

(b) Open the following access doors: 113DB, 121FB, 151DB, 153AB, 153BB, 541AB, 641AB, 411JL, 421JR, 431JL, 441JR.

(c) Pressurize Green, Blue and Yellow hydraulic systems (Ref. 29-11-00, 29-12-00 and 29-21-00, Servicing).

PRINTED IN ENGLAND

B (3) Inspection/Check

B (a) Before operating any of the following hydraulically actuated controls ensure that operating ranges of controls are clear of persons and equipment. Position barriers to prevent persons from entering area of control operation.

B (b) Set flight controls in electrical or mechanical mode (Ref. 27-00-00, Servicing) and operate over their full range.

B (c) Operate air intake ramp actuators and spill doors over full range (Ref. 71-63-00, 71-64-00, Servicing).

B NOTE: If a hydraulic leak is found from the ramp actuator, the secondary air door screw jacks must be disconnected and the door bearings checked for free movement (Ref. 71-31-12 Page 401 Paragraph 1).

B (d) Operate droop nose and visor in NORMAL system (Ref. 27-61-00, Adjustment/Test). Particular care should be taken before operating this control that there is adequate operating clearance for nose pitot head.

B NOTE: Each respective hydraulic system must be pressurized for a minimum of 15 mins to allow reasonable operation of hydraulic controls and allow any external leakage to establish itself.

B (e) During operation of controls check for leakage in areas where it is safe to do so. Remaining areas to be checked for leakage with hydraulic systems depressurised and controls made safe.

B (f) The post probable areas for leakage are as follows:

B (f1) Elevon and rudder P.F.C.U.s - if leakage is noted from fairings, these must be removed to identify source of leakage.

B (f2) Forward hydraulic bay - with special attention to relay jacks.

B (f3) Rear hydraulic equipment bay.

PRINTED IN ENGLAND

B (f4) Electric pump bay - with special attention to pipe expansion joints.

B (f5) Intake side access bays - with special attention to HP filters.

B (g) Any leak greater than permissible leakage values (Ref. 29-00-00, Inspection/Check) or respective component leakage values should be rectified and system rechecked for leakage.

B (4) Close-Up

B (a) Shut down hydraulic power source.

B (b) Make safe all control systems concerned.

B (c) Close all access doors.

PRINTED IN ENGLAND

GENERAL - APPROVED REPAIRS

1. General

This topic covers the repairs which can be performed on hoses in
R the engine bays and details the permissible damage on AM350
R and Z3CN18 rigid pipes.
Repairs to rigid pipes are covered in Chapt. 20-23-23.

2. Hoses in Engine Bays

A. Equipment and Materials

DESCRIPTION	PART NO.
Glues and Adhesives (Ref. 20-30-00, No.313)	
Cleaning (Ref. 20-30-00, No.462)	
Special Materials (Ref. 20-30-00, No.170)	
Access Platform, 3.251 m (10 ft. 8 in.)	

B. Prepare

(1) Remove hoses to be repaired (Ref. 29-00-00, Servicing).

C. Approved Repairs

(1) 97273 Series Assemblies.

NOTE : All 97273 series assemblies utilize a silicone-glass yarn reinforced tape as fire sleeving. If the fire sleeve is damaged and requires complete replacement, follow steps C.(1)(a) to C.(1)(b). If damage is minor and the fire sleeve is considered repairable, follow steps C.(1)(h) to C.(1)(k).

(a) Carefully remove all the fire sleeve from the shroud (The assembly does not need dismantling to carry this out), but leave the asbestos packing pieces in place.

(b) Wrap one layer of tape (Product No.170) around shroud outer braiding. The tape is to be butted,

with no overlap (maximum allowable space between the tape is 1/16 in. (1.6 mm)). Apply slight tension during wrapping.

(c) Wrap two additional layers of tape as follows :

(c1) Wrap the second layer of tape between the shroud housing flanges (the flange with the "C" spanner slots) with no overlap (maximum allowable space between tape is 1/16 in. (1.6 mm)). Apply slight tension during wrapping.
This wrap is to be in the opposite direction to the initial wrap.

(c2) The third and final wrap again goes from flange to flange as in step (c1) but as follows.

(c3) Wrap one full turn, then spiral on the entire length with a 50% overlap, in a counter wrap direction from the second layer, with slight tape tension. At the end, wrap one full overlap prior to cutting tape.

<u>CAUTION</u> : CUT TAPE JUST PRIOR TO FINISHING LAP SO AS NOT TO CUT INNER LAYERS.

(d) When a boss in involved in the area to be covered, some adjustment in pitch must be made. The adjustment should continue to provide an overlap of at least 10% at a point 180° away from the boss. A "V" shaped miss on either side of the boss is normal and acceptable.

(e) Multiple tape splices are allowed on the two inner wraps only. A one inch overlap is required at a splice. One splice is allowable on the outer layer.

(f) During wrapping, caution should be exercised to prevent contact of the bare tape with any contaminants, or contact with any residue on the hands. This will result in film deposit and prevent proper adhesion at the tape bond interface.

(g) After completion of the wraps, inspect all edges and cut ends to ensure complete contact and bond. The tape is self-adhesive and self-bonding at room temperature.

(h) If the fire sleeve only has a small area of damage, it is possible to repair this without removing the original sleeve.

(i) Clean damaged area of fire sleeve with Product No.462 so as to have no residue film that will prevent bonding of tape Product No.170.

(j) Wrap silicon tape Product No.170 over the damaged area with a 50% overlap and under slight tension.

(k) The tape should extend both sides of the damaged area so as to offer adequate protection. Steps C.(1)(f) and C.(1)(g) are to be carried out at this stage.

(2) YA000615 and YA000721 Assemblies

NOTE : The above assemblies utilize an asbestos sock impregnated with silicone as a fire sleeve. Should the fire sleeve be damaged beyond repair the entire assembly should be returned to the manufacturer for repair. If the fire sleeve receives minor damage, it may be repaired as follows.

(a) Clean damaged area of fire sleeve with Product No.462 so as to have no residue film.

(b) Fill damaged area with Product No.313. The filling should be sufficient to return the damaged area to its original diameter.

(c) Wrap tape Product No.170 over the damaged area with a 50% overlap and under slight tension.

(d) The tape Product No.170 should extend both sides of the damaged area so as to offer adequate protection.

(e) The tape Product No.170 will adhere and bond to itself but will not provide a complete bond with the original covering of Product No.313. It will therefore be necessary to wire the extreme ends of the tape down to the original asbestos silicone sock.

(f) During wrapping, caution should be exercised to prevent contact of the bare tape with any contaminants, or contact with any residue on

the hands. This will result in film deposit and prevent proper adhesion at the tape bond interface.

(g) After completion of the wraps, inspect all edges and cut ends to ensure complete contact and bond. The tape is self-adhesive and self-bonding at room temperature.

D. Close-Up

Install hoses (Ref. 29-00-00, Servicing).

3. Permissible Damage on AM350 and Z3CN18 Pipes

TUBE DIAMETER & THICKNESS AM350 (CM84A) TUBING	DEPTH OF PERMISSIBLE DAMAGE	
	DENTS	NICKS
3/16 x 0.457 mm	- 0.15 mm - 0.0059 in.	- 0.30 mm - 0.0118 in.
1/4 x 0.457 mm	- 0.15 mm - 0.0059 in.	- 0.30 mm - 0.0118 in.
5/16 x 0.457 mm	- 0.09 mm - 0.0035 in.	- 0.18 mm - 0.0071 in.
3/8 x 0.610 mm	- 0.09 mm - 0.0035 in.	- 0.18 mm - 0.0071 in.
1/2 x 0.813 mm	- 0.12 mm - 0.0047 in.	- 0.22 mm - 0.0087 in.
5/8 x 1.219 mm	- 0.16 mm - 0.0063 in.	- 0.26 mm - 0.0102 in.
3/4 x 1.422 mm	- 0.20 mm - 0.0079 in.	- 0.30 mm - 0.0118 in.
1 x 1.829 mm	- 0.20 mm - 0.0079 in.	- 0.30 mm - 0.0118 in.

TUBE DIAMETER & THICKNESS Z3CN18 (CM76A) TUBING	DEPTH OF PERMISSIBLE DAMAGE	
	DENTS	NICKS
5/16 X 0.457 mm	- 0.09 mm - 0.0035 in.	- 0.18 mm - 0.0071 in.
3/8 X 0.457 mm	- 0.09 mm - 0.0035 in.	- 0.18 mm - 0.0071 in.
1/2 X 0.457 mm	- 0.12 mm - 0.0047 in.	- 0.22 mm - 0.0087 in.
5/8 X 0.457 mm	- 0.16 mm - 0.0063 in.	- 0.26 mm - 0.0102 in.
3/4 X 0.457 mm	- 0.20 mm - 0.0079 in.	- 0.30 mm - 0.0118 in.
1 X 0.508 mm	- 0.20 mm - 0.0079 in.	- 0.30 mm - 0.0118 in.
1 1/4 X 0.559 mm	- 0.20 mm - 0.0079 in.	- 0.30 mm - 0.0118 in.
1 1/2 X 0.559 mm	- 0.20 mm - 0.0079 in.	- 0.30 mm - 0.0118 in.

Printed in England

4. Hydraulic Rigid Pipe Replacement Using Alternative Material

A. Hydraulic pipes originally manufactured from titanium tube (CM087) and end fittings may be manufactured by British Airways (BA) using stainless steel tube (CM084), stainless steel nipples and couplings and either titanium or stainless steel nuts as specified.

	ORIGINAL	BA ALTERNATIVE
TUBE	NSA 3515 (CM087)	NSA 3508 (CM084)
NIPPLES	NSA 830012 NSA 830117	NSA 8412 NSA 8438
COUPLINGS	NSA 830011	NSA 8411
NUTS	NSA 830010	NSA 830010 or NSA 8409

Induction brazing process should be carried out in accordance with British Airways Standards and Process Manual 20-26-01 (MP 141) and the original pipe drawing.

NOTE: BA do not currently have the capability to induction braze hydraulic pipe assemblies in accordance with MP 586, this process is required for hydraulic pipes located in a fire zone. If MP 586 is a drawing requirement, capability must be sourced externally with the manufacturers or their authorized repair agency.

Serviceable nuts may be re-used where appropriate.

PRINTED IN ENGLAND

5. Emergency Hydraulic Repair Kit

CAUTION : ENSURE THAT THE USE OF THIS KIT DOES NOT PERMIT THE STANDARDS OF SAFETY AND AIRWORTHINESS TO BE ADVERSLY AFFECTED IN ANY WAY.

A. Repair kits are positioned at all line stations to enable leaking pipes, unions and seals to be temporarily repaired.

B. The kit is defined by drawing 3BA 12547, issued F. Temporary repairs are based on the use of MS Flareless couplings and flexible hoses to bypass the damaged section of pipe. Various lengths of 1/4" 3/8" and 1/2" diameter hoses are provided, together with sleeves, nuts, unions and reducer unions to allow connection to all sizes of pipe from 3/16" to 3/4" diameter. HP and LP blanks are also provided to allow for blanking off sub-systems when temporary repair is not possible. This selection of hoses and fittings has been made after consideration of the types and location of failures which seem most likely to occur. The use of flexibles hoses with MS flareless fittings is dictated by considerations of cost and availability.

C. Standard fitting procedures should be used when making temporary repairs with the items from this kit, but the following information is offered on procedures that should be adopted at the time of leak detection :

(1) If a leak occurs at a coupling nut, and loosening and re-tightening has not corrected the leak, then reverse the union to provide a new seating surface, and replace the union 'O' ring or line with parts from the temporary repair kit. Care should be taken not to overtorque the nut in an effort to cure the leak, as this often results in splitting of the nut.

(2) If a leak occurs at an 'O' ring it is suggested that the union be reversed if possible, in order to provide a new sealing surface, before installing a new 'O' ring.

Printed in England

B (2) Cont.d.
B Many nibbled and damaged 'O' rings are caused by a damaged sealing face, and they do not always leak when on the ground, but later on during flight.

B (3) If a leak is traced to chafed line, it should be replaced with a hose assembly from the repair kit.

B (4) Except for flexible hoses, MS Flareless couplings are not used on Concorde and it will therefore not be possible (except when replacing a flexible hose) to connect one end of the repair hose directly to a pipe or component. This means that it will almost always be necessary to cut the damaged pipe and make the connection at each end of the hose with an MS Flareless Sleeve, nut and union. This may make some repairs rather more difficult but one slight advantage is that it is not necessary to use mandrels when setting the flareless sleeves on the HP pipes.

B NOTES

B (a) If it is ever found necessary to cut the sound end off a pipe, in order to bypass a leak close to the end of its adjoining pipe, the end removed should be returned with the aircraft to LHR, where it can be permanently re-attached with a new 4000 psi. "Permaswage" fitting.

B (b) On the HP lines the repair kit hose may appear to fit directly on to the pipe coupling because the NSA 8400 connectors used have standard UN threads. However, the NSA 8400 brazed nipple seats in a 45° cone and the smaller radius on the MS Flareless "Globeseal" nipple, which seats in a 24° cone, is unlikely to seal properly in the NSA fitting and will almost certainly damage the seating. Where a failure occurs near a component which is fitted with an NAS union, the repair may be made by removing the union and replacing with an MS union (or reducer union).

B (5) When repairing items on or adjacent to moving components, ensure that distortion, chafing or other damage is avoided by careful selection, fitment and routing of the repair item. Whenever possible all moving components in the vicinity of the repair should be exercised over their full range.

(5) Cont.d.

NOTE : Because it is not always possible to exercise the landing gear following emergency repairs extra care is required in these area's, particularly when the hose being replaced has an angled end fitting.

(6) If temporary hose replacement is required for the hydraulic brake hose between sliding tube and the barrel/drag strut rigid pipe on the main landing gear then special brake pipe coupling is to be used at the barrel/drag strut connection.

D. When Kit components are used for temporary repairs, a 'B' snag note to this effect should be made, and replacements requested, so that the kit can be maintained with its full complement of parts.

E. Kit consists of the following items :-

ITEM	PART NUMBER	QUANTITY
TEFLON 4000 PSI HOSE ASSY		
-MS FLARELESS ENDS -(UNITUBES LTD)		
1/4" -Type 370-4 9" long	105573	2
" " 12" long	105574	2
" " 15" long	105575	2
" " 18" long	105576	2
3/8" -Type 660-6 12" long	105577	1
" " 15" long	105578	1
" " 18" long	105579	1
" " 21" long	105580	1
1/2" -Type 660-8 12" long	105581	1
" " 15" long	105582	1
" " 18" long	105583	1
" " 21" long	105584	1
REDUCER UNIONS (STEEL) (OR CRS - ADD J OR K IN PLACE OF FIRST DASH)		
1/4 to 3/16	MS21916-4-3	4
5/16 to 1/4	" -5-4	4
5/8 to 1/2	" -10-8	2*
3/4 to 1/2	" -12-8	2

B	D/E UNIONS (STEEL)	(OR CRS - ADD J OR K IN PLACE OF DASH)		
B	1/4	MS21902-4	4	*
B	3/8	" -6	4	*
B	1/2	" -8	4	

B E. Cont.d.

	ITEM	PART NUMBER	QUANTITY
B	'0' RINGS		
B	"	BAS 9059-3	4
B	"	" " -4	4
B	"	" " -5	4
B	"	" " -6	4
B	"	" " -8	4
B	"	" " -10	4
B	"	" " -12	4
B	"	" " =16	4
B	HP BLANKING CAP ASSYS		
B	-MS FLARELESS (STEEL)	(OR CRS - ADD J OR K AFTER DASH NO)	
B	1/4"	MS21914-4	2 *
B	3/8"	" -6	2 *
B	1/2"	" -8	2 *

	-NSA (SPECIAL TO CONCORDE) (CRS)	BLANK		NUT	QTY
B	3/16	NSA 8419-3	2	NSA 8409-3	2
B	1/4	" -4	2	" " -4	2
B	5/16	" -5	2	" " -5	2
B	3/8	" -6	2	" " -6	2
B	1/2	" -8	2	" " -8	2
B	5/8	" -10	2	" " -10	2
B	3/4	" -12	2	" " -12	2

B COUPLING NUTS (STEEL) (OR CRS ADD J, K OR S AFTER DASH NO)

B	3/16	MS21921-3	4
B	1/4	" -4	4 *
B	5/16	" -5	4
B	3/8	" -6	4 *
B	1/2	" -8	4 *
B	5/8	" -10	4 *
B	3/4	" -12	4 *

B FLARELESS SLEEVES (STEEL) (OR CRS - ADD C AFTER DASH NO)

B	3/16	MS21922-3	4
B	1/4	" -4	4 *
B	5/16	" -5	4
B	3/8	" -6	4 *
B	1/2	" -8	4 *
B	5/8	" -10	4 *
B	3/4	" -12	4 *

B NOTE : Items marked with an asterisk are called up for B707 and
B B747 stations by Drawing number BOA-B84601 Parts 'A',

Printed in England

B 'C' & 'D'.

B E. Cont.d.

B HP BLANKING PLUGS (FEMALE) (SPECIAL TO CONCORDE) (CRS)

	ITEM	PART NUMBER	QUANTITY
B	3/16	NSA 8408-3	2
B	1/4	" " -4	2
B	5/16	" " -5	2
B	3/8	" " -6	2
B	1/2	" " -8	2
B	5/8	" " -10	2
B	3/4	" " -12	2

B LP BLANKING CAPS ASSEMBLIES (AN FLARED RETURN LINES) (AL ALLOY)

B	3/16	AN929-3	2
B	1/4	" -4	2
B	5/16	" -5	2
B	3/8	" -6	2
B	1/2	" -8	2
B	5/8	" -10	2
B	3/4	" -12	2
B	1	" -16	2

B LP BLANKING PLUGS (AN FLARED RETURN LINES) (AL ALLOY)

B	3/16	AN806-D3	2
B	1/4	" -D4	2
B	5/16	" -D5	2
B	3/8	" -D6	2
B	1/2	" -D8	2
B	5/8	" -D10	2
B	3/4	" -D12	2
B	1	" -D16	2

B SPECIAL BRAKE PIPE (FLATED TO FLARELESS COUPLING) See step
B 3.c.(6).

B	3/8	4-BA19825-1	2
B	1/2	4-BA19825-2	2

END OF THIS SECTION

NEXT

MAIN - DESCRIPTION AND OPERATION

1. General

R Main hydraulic power is supplied by two systems identified as the Green system and the Blue system. Each is independent of
R the other, with its own control system. They are supplied from
R tanks pressurized by air bled from the engines.
Each system is pressurized by two self-regulating pumps driven
R by the engine accessory gearboxes.

Printed in England

PRINTED IN ENGLAND

GREEN SYSTEM - DESCRIPTION AND OPERATION

1. General

The Green hydraulic system provides the normal power supply to the following services:

No.1 and No.2 engine air intakes
Normal braking distribution manifold
Main landing gear and main landing gear door selectors
Nose landing gear and nose landing gear door selectors
Tail landing gear selectors
Nose gear steering distribution manifold
Visor and droop nose selectors
The electro-hydraulic selector for a half-body of each relay jack
One artificial feel jack on each of the three axes
The electro-hydraulic selector for a half-body of each power flight-control unit (PFCU)
The emergency a.c. generator hydraulic motor selector
The fuel transfer pump hydraulic motor selector.

2. Description

R ON A/C 001-006 (Ref. Fig. 001)
R On A.C 007-007 (Ref. Fig. 001A)

R After SB 29-041 For A/C 001-005 (Ref. Fig. 001B)

A. The Green System Includes the Following Components:

One hydraulic tank assembly (3100)
One tank de-aerator safety valve (0196)
Two heat exchangers (3118) and (3117)
Two shut-off valves (3119) and (3120)
Two self-regulating engine-driven pumps (0876) and (0877)
Non-return valve (1351)
Two low pressure switches (0124) and (0125)
Non-return valve (5124)

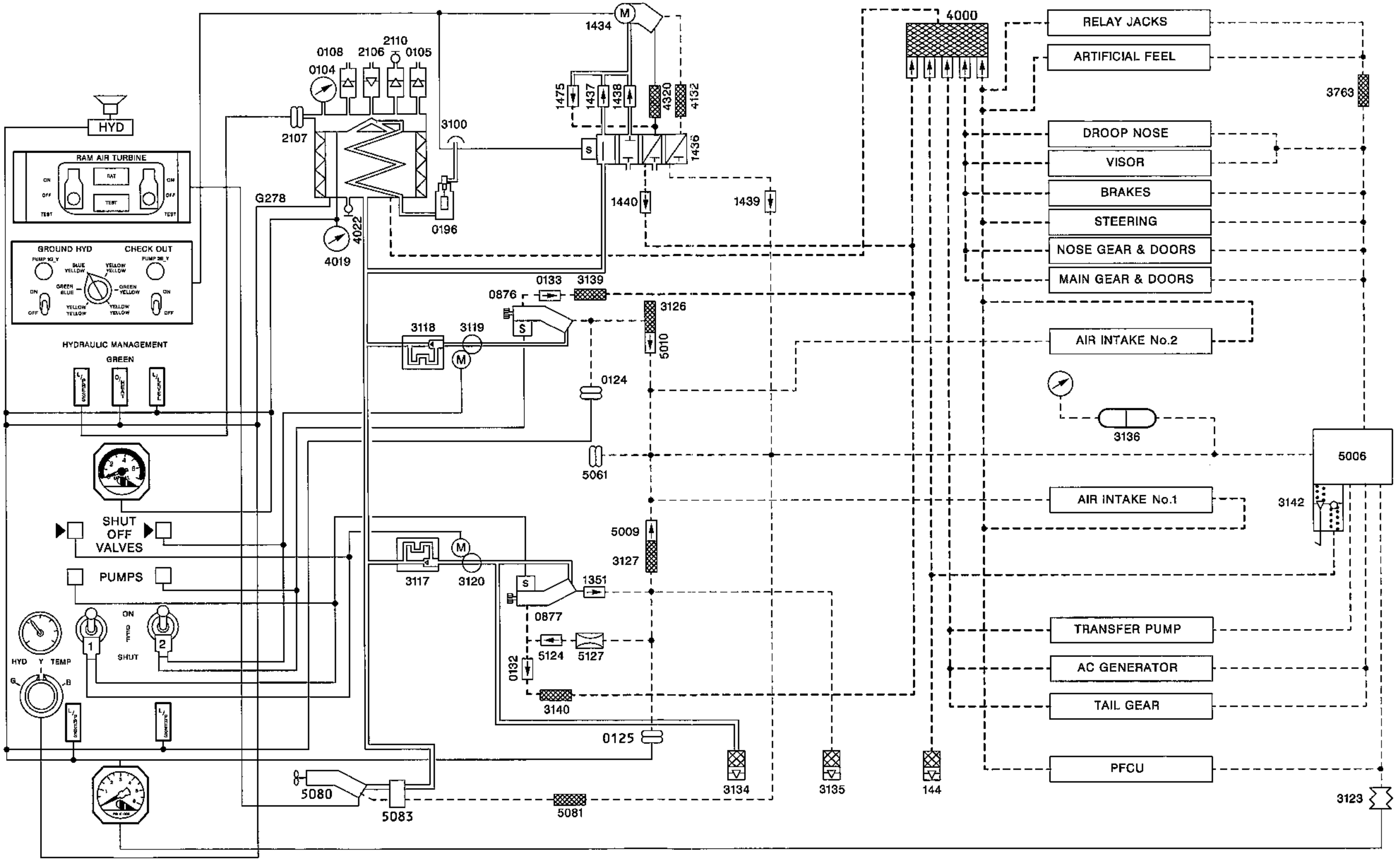
After SB 29-041 For A/C 001-005

Two pulse dampers (5148) and (5149)
Restrictor (5127)
Two HP micronic filters (3126) and (3127)
Two HP filter mounting plates (5010) and (5009) with incorporated non-return valve
Pressure switch (5061) (air intake monitoring)
Non-return valve (1439)

PRINTED IN ENGLAND

INTENTIONALLY BLANK

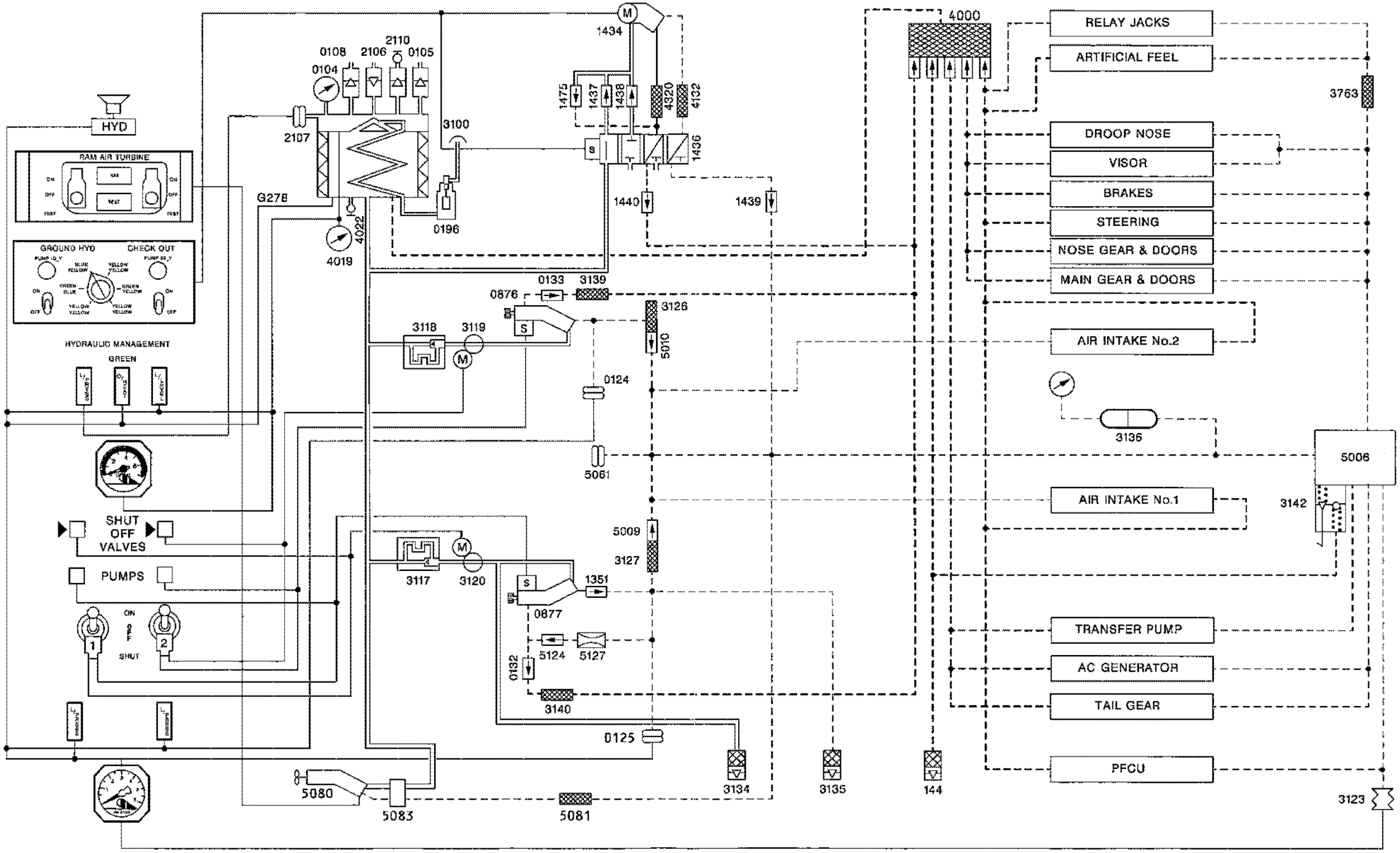
PRINTED IN ENGLAND



Green System
Figure 001

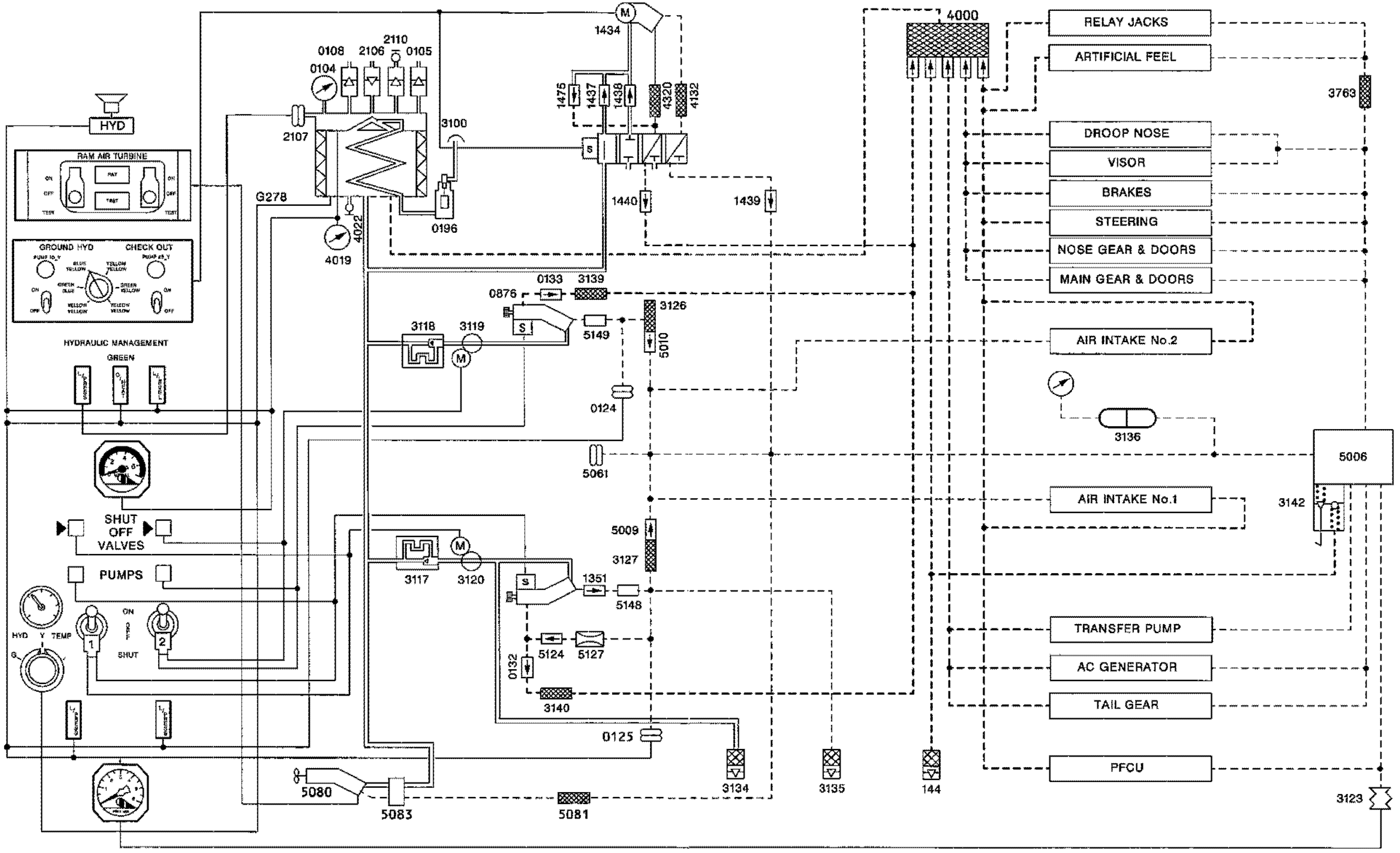
CMB 29 11 00 0 AAMA 00

PRINTED IN ENGLAND



CMB 29 11 00 0 AAMJ 00

Green System
Figure 001A



Green System
Figure 001B

PRINTED IN ENGLAND

CMB 29 11 00 0 AAMS 00

HP manifold (5006)
Pressure relief and manual unloading valve (3142)
Accumulator (3136)
Pressure transmitter (3123)
HP filter (3763)
Three LP non-return valves (0133), (0132) and (1440)
Two case drain filters (3139) and (3140)
Tank return filter (3 micron) (4000)
Two system pressurization ground connectors (3155) and (3134)
Tank ground filling connector (144).

3. Tank Assembly (Ref. Fig. 002)

The Green hydraulic tank contains the fluid required by the pumps to provide the power necessary for operation of the various aircraft systems.

A. Leading Particulars

Maximum capacity : 7.1 US gal (5.9 Imp. gal, 27 litres)
Normal fill level : 4 US gal (3.3 Imp. gal, 15 litres)
R Low level warning : 1.8 US gal (1.5 Imp. gal, 7 litres)

No account is taken of the amount of fluid contained in the bellows when compressed. The amount of fluid not indicated on the indicator is 0.9 US gal (0.747 Imp. gal, 3.4 litres).

HP manifold (5006)
Pressure relief and manual unloading valve (3142)
Accumulator (3136)
Pressure transmitter (3123)
HP filter (3763)
Three LP non-return valves (0133), (0132) and (1440)
Two case drain filters (3139) and (3140)
Tank return filter (3 micron) (4000)
Two system pressurization ground connectors (3155) and (3134)
Tank ground filling connector (144).

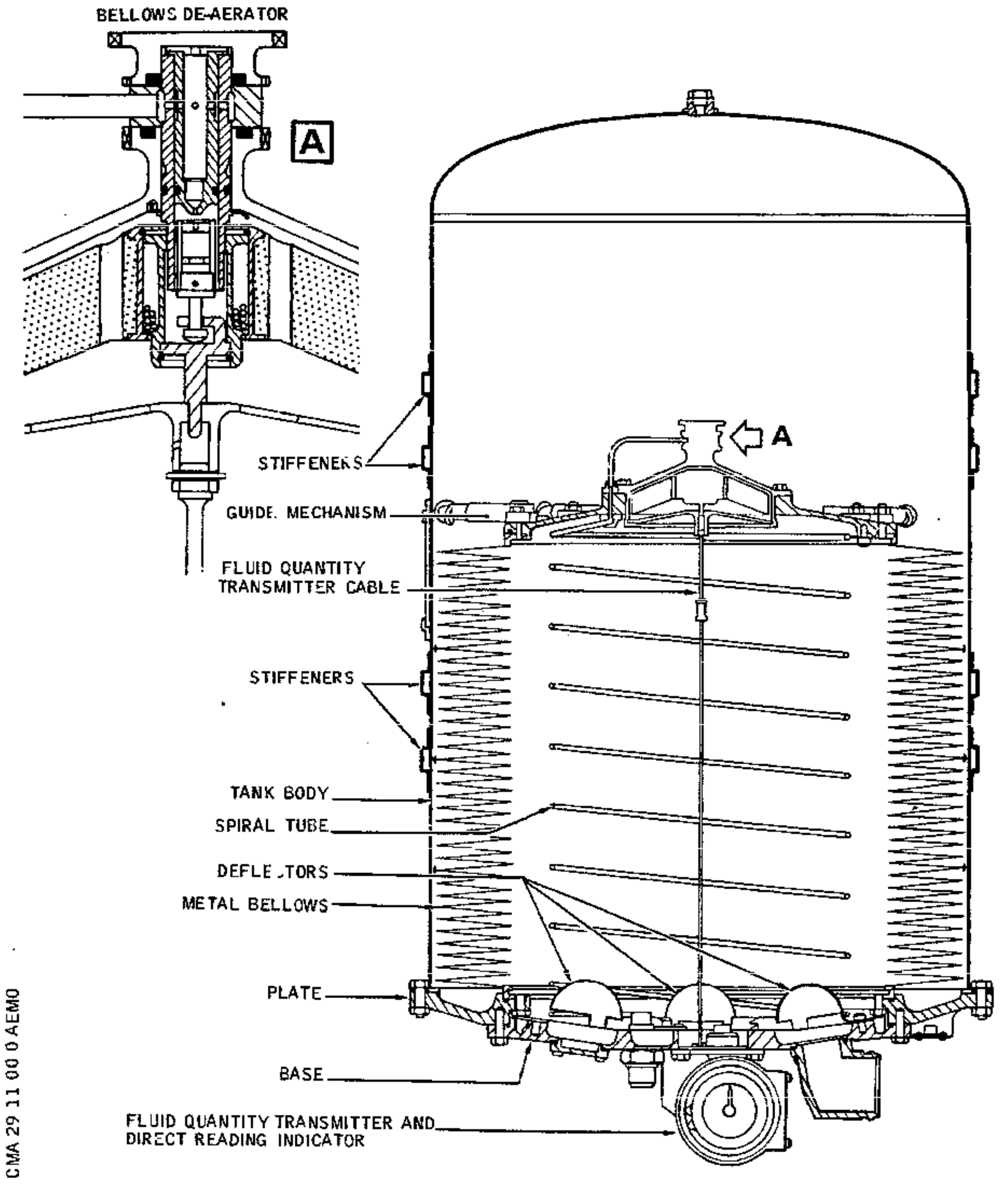
3. Tank Assembly (Ref. Fig. 002)

The Green hydraulic tank contains the fluid required by the pumps to provide the power necessary for operation of the various aircraft systems.

A. Leading Particulars

Maximum capacity	: 7.1 US gal (5.9 Imp. gal, 27 litres)
Normal fill level	: 4 US gal (3.3 Imp. gal, 15 litres)
R Low level warning	: 1.8 US gal (1.5 Imp. gal, 7 litres)

No account is taken of the amount of fluid contained in the bellows when compressed. The amount of fluid not indicated on the indicator is 0.9 US gal (0.747 Imp. gal, 3.4 litres).



Green Tank Assembly
Figure 002

B. Description (Ref. Fig. 003)

(1) The tank consists of :

(a) A cylindrical body strengthened by four external stiffeners, and closed at the top by a welded cover and at the base by a bolted plate supporting the bellows.

(b) A metal bellows fitted with guides. The hydraulic fluid is contained inside the bellows, whilst pressurizing air acts on the outside.

(2) The following components are mounted on the tank :

(a) A de-aerator connected to ambient by a spiral tube.

(b) Fluid quantity transmitter (4019) with a direct reading indicator.

(c) Pressurization non-return valve (0105)

(d) Direct reading air pressure indicator (0104)

(e) Low pressure switch (2107) (air pressure)

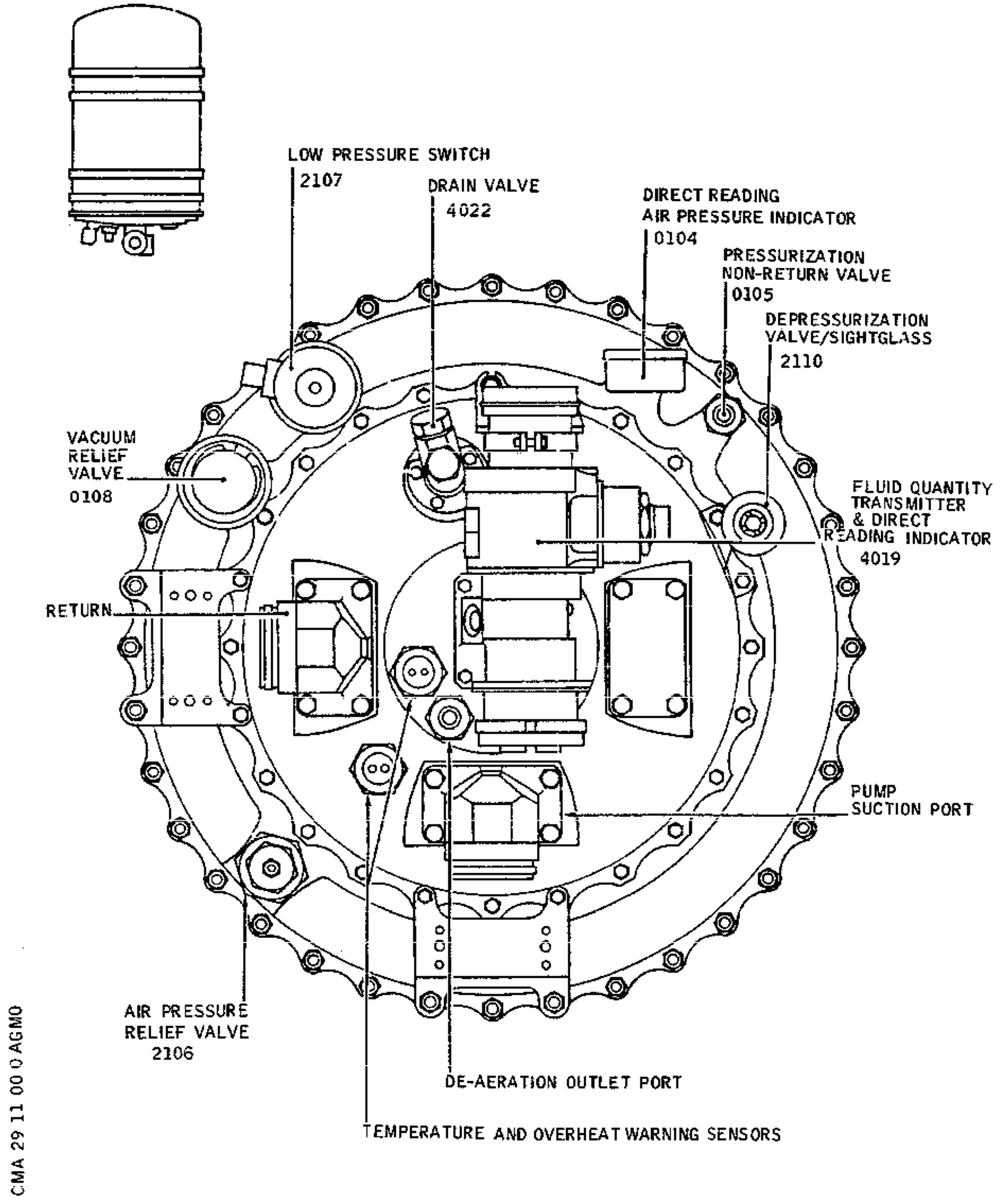
(f) Air pressure relief valve (2106)

(g) Vacuum relief valve (0108)

(h) Depressurization valve/sightglass (2110)

(i) Drain valve (4022)

(j) Overheat warning sensor (G278).



Green Tank Components
Figure 003

(k) Temperature sensor (D225)

C. Operation

(1) Pressurizing air acts upon the outside of the bellows, which contains the hydraulic fluid.

As the air and fluid are separated, fluid contamination, emulsion or oxidation is avoided.

(2) The tank is filled or topped up by means of a hydraulic ground unit connected into a tank return line by a quick-disconnect self-sealing ground connector. The fluid is filtered before entering the bellows.

(3) A de-aerator mounted at the top of the bellows, and connected to the bottom of the tank, and then to a de-aerator safety valve, by a spiral tube, provides continuous evacuation through the tube, of any air which may enter the bellows.

(4) A fluid quantity transmitter and direct reading indicator assembly allows :

(a) Direct reading of the quantity of fluid in the tank.

(b) Electrical transmission to the quantity indicator on the Flight Engineer's panel.

(c) Control of a microswitch which, when the minimum level is reached :

- Illuminates L/LEVEL warning light on the Flight Engineer's panel.
- Illuminates HYD warning light on the master warning panel.
- Triggers the aural warning gong.
- Shuts off the normal hydraulic power supply to the two associated air intakes.
- Automatically switches over the two air intakes to the Yellow auxiliary system.

(d) Discharge of any excess hydraulic fluid in the tank.

(e) A cable connecting the internal mechanism of the quantity indicator to the top of the bellows transmits bellows movement to the indicator.

(5) Pressurizing air is admitted to the tank through a non-return valve.

(6) A low pressure switch calibrated to 29 ± 1.45 psi (2 ± 0.1 bars) controls the L/PRESS warning light on the Flight Engineer's panel.

(7) A pressure indicator gives a direct reading of tank air pressure.

(8) A pressure relief valve allows any excess air, which could create tank overpressure, to be vented to ambient.

(9) A vacuum relief valve opens when the pressure differential between the tank and outside pressure reaches 0.34 psi (23 mb).

(10) A depressurization valve and sightglass assembly permits :

- Drainage of condensation water
- Checking of the bellows for leakage by making certain that there is no fluid in the air compartment
- Depressurization of the tank, by rotating the knurled control knob.

(11) The tank can be drained through a drain valve.

(12) In the event of fluid overheat, a temperature sensor illuminates the O/HEAT caption light on the Flight Engineer's panel and the HYD warning light on the master warning panel, and also triggers the aural warning gong.

(13) A second temperature sensor transmits hydraulic fluid temperature information to the Flight Engineer's panel.

4. Heat Exchangers
(Ref. Fig. 004)

A. General

(1) During flight, heat is generated in the hydraulic system due to internal leakages. To maintain system fluid at an acceptable temperature, it is cooled in hydraulic fluid/fuel heat exchangers.

(2) As a safety precaution hydraulic fluid in the heat exchangers is kept at a higher pressure than the fuel.

(3) A by-pass valve on the hydraulic fluid line side opens when :

- Fluid temperature is below 140°F (60°C)
- The flow rate exceeds 9.25 US gal/min. (7.7 Imp. gal/min., 35 litres/min.).

(4) There are two types of heat exchanger :

- The type 4 single exchangers, mounted on engines 1 and 3.
  (On engine 1 hydraulic pump suction line and fuel supply line)
  (On engine 3 hydraulic pump suction line and fuel supply line).
- The type 3 double heat exchanger, formed by coupling two separate exchangers together, one connected to the main system, the other to the Yellow auxiliary system.
  This type of exchanger is mounted on engines 2 and 4 hydraulic pump suction lines and fuel supply lines. Each of these engines drives two pumps, one for the main and one for the auxiliary system.

B. Heat Exchanger Construction

(1) Single heat exchanger (type 4):

This consists of a Type 1 core assembly upon which is mounted at one end a molded housing containing the fuel and hydraulic fluid inlet and outlet ports, and at the other end a cap in AU4G which ensures the transfer of fuel inside, and of hydraulic fluid outside, the core tubes.

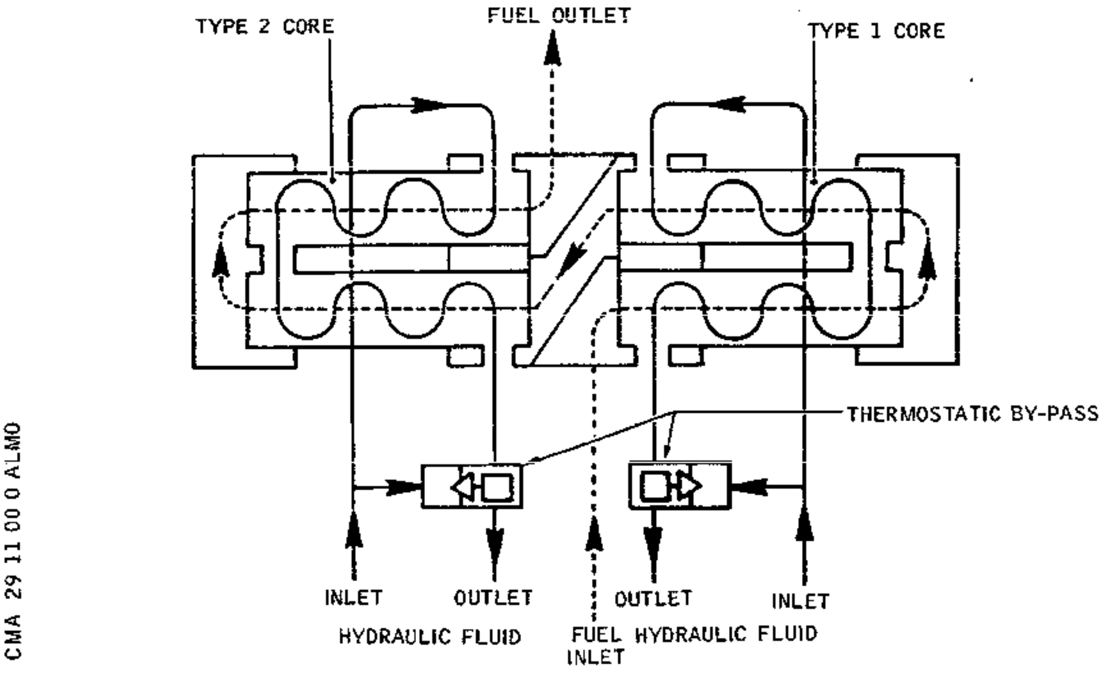
A by-pass fitted with a thermostatic valve with incorporated pressure relief valve, is mounted on the housing.

The core is made of two brazed light alloy tube assemblies.

(2) Double heat exchanger (Type 3):

This consists of two individual heat exchangers composed of a Type 1 and a Type 2 core, mounted on either side of a central molded support containing the fuel inlet and outlet ports, as well as those of the normal and auxiliary hydraulic systems. It is designed so as to link the core tubes in series, thus providing a single fuel system across the two core assemblies.

The other end of each core bears a cap in AU4G for fuel and hydraulic fluid transfer from one tube assembly to the other of the same core.



Heat Exchanger (Type 3) Circulation Diagram
Figure 004

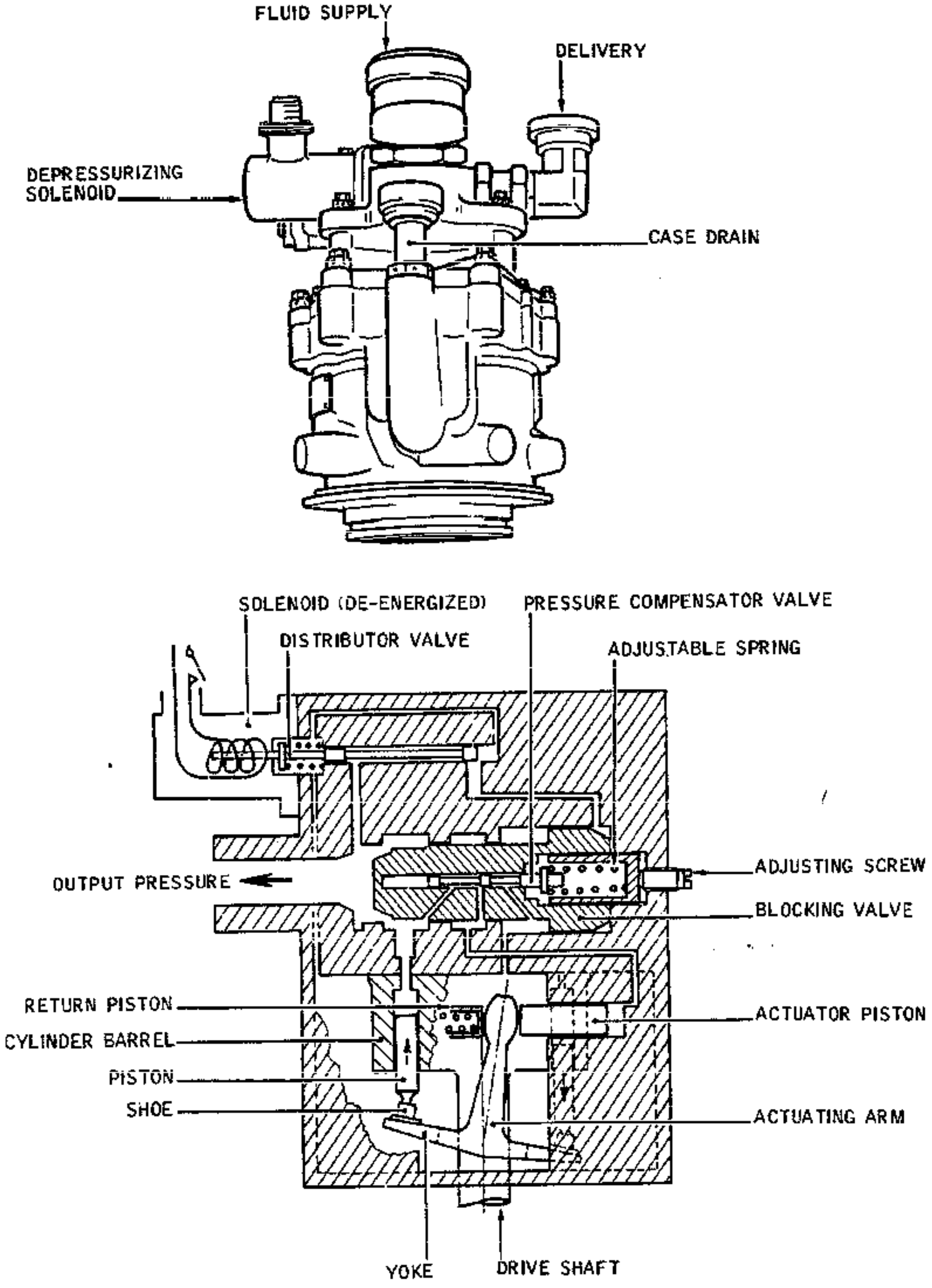
5. Pumps - Engine-Driven
(Ref. Fig. 005)

A. Description

Each pump contains a rotating cylinder barrel, integral with the drive shaft. The barrel houses nine pistons bearing against a yoke by means of shoes, which are balanced hydraulically by a thin film of fluid, maintained between the shoes, admitting fluid from the system.

B. Operation

The rotation of the barrel in relation to the yoke imparts a reciprocating movement to the pistons, which draw in and discharge hydraulic fluid. The tilt angle of the yoke is controlled by an arm driven in one direction by a servo-



CMA 29 11 00 0 ANMO

Engine-Driven Hydraulic Pumps
Figure 005

controlled actuator piston, and in the other by a return piston.

C. Regulation

Automatic regulation of delivery pressure is achieved by adapting flow to demand, while maintaining a pre-determined pressure of 4000 psi (275 bars).
Delivery pressure is applied to the slide of a pressure compensator valve, which is spring-loaded shut. The spring is adjustable. When delivery pressure exceeds the spring calibration the compensator valve slide is displaced and pressure is admitted to the actuator piston controlling the tilt angle of the yoke. The tilt angle is reduced, producing a consequent reduction in flow and with the result that the required delivery pressure is maintained. When delivery pressure is below spring calibration, the slide valve closes again and pressure is no longer applied to the actuator piston controlling the yoke angle. The latter is then driven back into the "maximum stroke" position by the return piston.

D. Depressurization

When the depressurizing solenoid is energized, delivery pressure is directed to the blocking valve, which closes the pressure outlet to the delivery line. Movement of this valve creates a new balance in the pressure compensator valve it contains, admitting pressure to the yoke actuator piston, and reducing pump output to zero.

There is no delivery into the system by the pump, but the slight pressure maintained inside it enables lubrication (return is via the case drain).

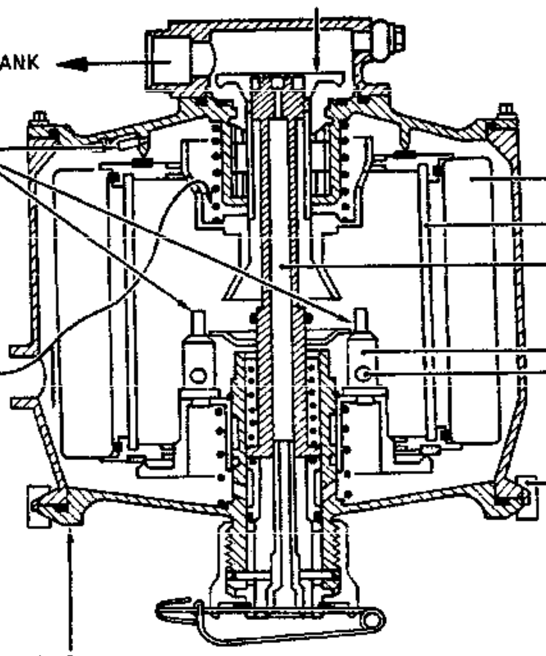
6. Filter Assy - Tank Return
(Ref. Fig. 006)

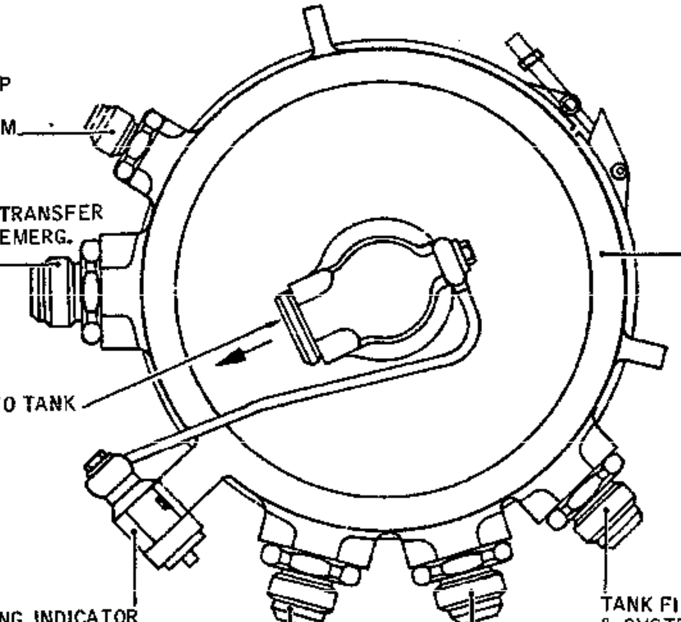
The filter assembly, which is enclosed in a casing, filters return fluid from the various services and pump case drains.

An isolation valve in the filter enables the filter to be replaced, without the tank having to be drained.

The main filter consists of 2 parts :

- An outer part of pleated glass cloth, protected by two perforated plates. The filtering capability of this element, which cannot be cleaned, is 3 microns, absolute.
- An inner part of nickel-plated wire mesh of 5 microns nominal (25 microns absolute) filtering capability. This element can





Tank Return Filter Assy
Schematic Normal Operation
Figure 006

be cleaned.

In the event of accidental clogging the filter element is protected by four by-pass valves, each of which is equipped with a 13-micron filter.

These valves open when the differential between inlet and outlet pressures reaches 13.05 psi (0.9 bars).

The four by-pass valve filters and the three filters on the cover, by-pass the main filter, enabling evacuation of any air which may accumulate in the filter housing.

7. Valve - Pressure Relief and Manual Unloading
(Ref. Fig. 007)

A. Description

In order to ensure smooth operation, the pressure relief valve is adjustable. It contains, in a single housing :

- a pilot slide valve assembly.
- a distributor slide valve assembly.

The pilot slide valve assembly is an easily removable and replaceable adjustable cartridge. Valve opening pressure is adjusted by means of an adjusting screw on the outside.

The distributor slide valve assembly consists of a sleeve in which moves a slide, controlled by a small actuating cylinder.

The unloading device is mounted at the end of the distributor slide valve.

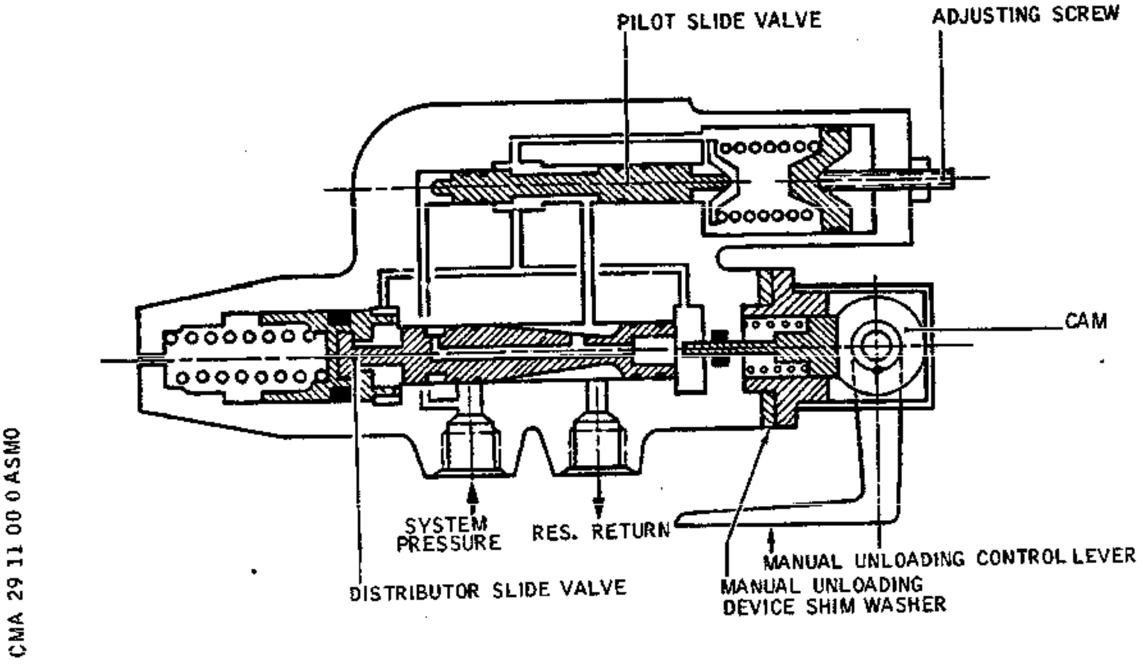
It comprises :

- A housing attached to the pressure relief valve
- A plunger piston
- A cam attached to a spindle. A control lever is attached to the protruding end of the spindle.

B. Operation (Ref. Fig. 007)

For system pressure between 0 and 4583 psi (0 to 316 bars), (opening pressure setting) the displacement of the pilot slide valve does not allow supply to the distributor slide valve actuating cylinder. The system, under pressure, is closed.

When a pressure of 4583 psi (316 bars) is reached, the



Pressure Relief and Manual Unloading Valve
Functional Diagram
Figure 007

connection to the distributor slide valve opens. However, in order to ensure smooth operation of the pressure relief valve, the pilot valve is designed as a pressure reducing valve. The servo pressure acting on the distributor slide valve actuating cylinder depends on the actuating cylinder spring calibration.

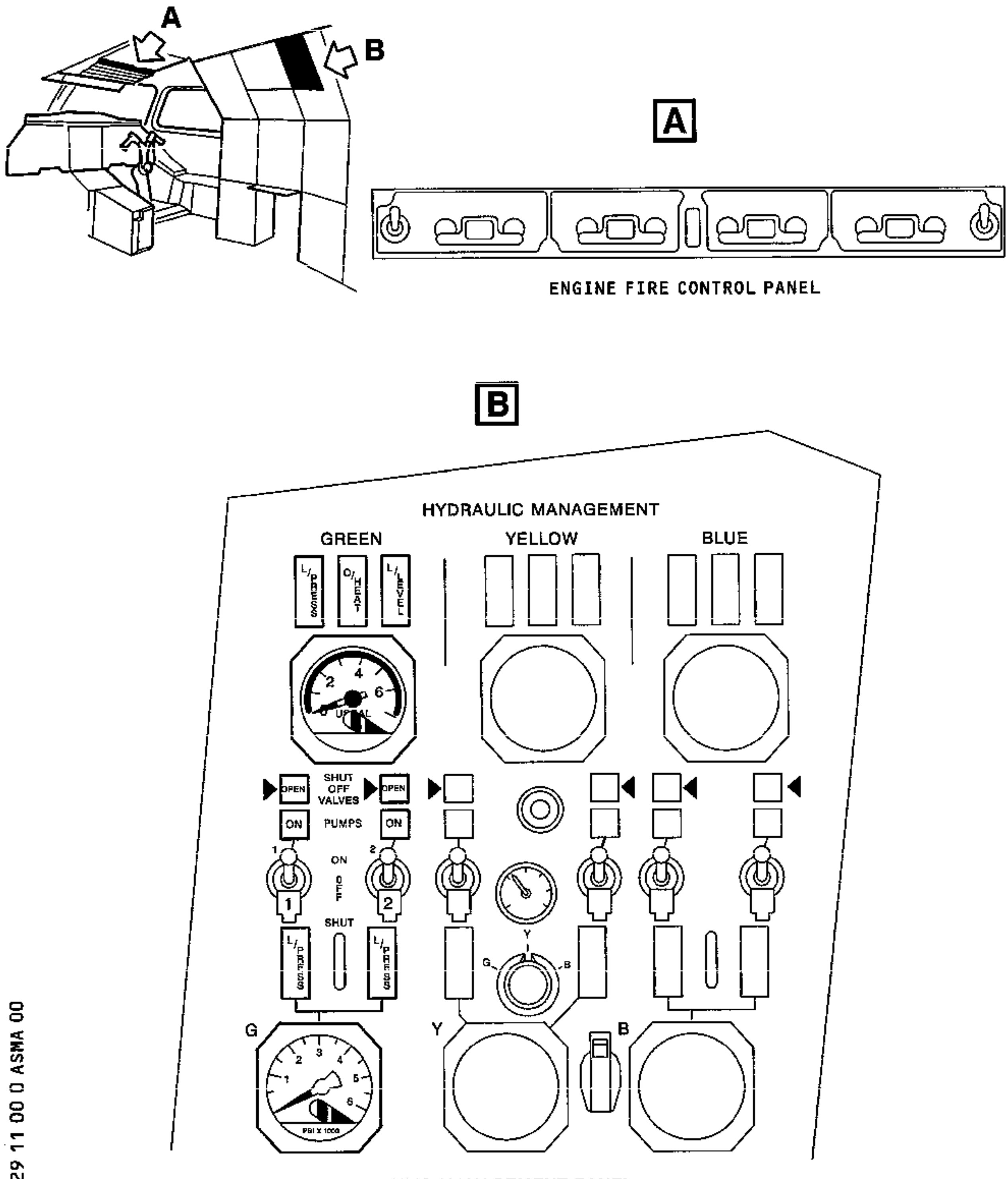
The system opens gradually by a relatively long piston stroke.

This design avoids any distributor slide valve vibration, and consequent uneven operation of the pressure relief valve.

8. Valve - Tank De-aerator Safety
(Ref. Fig. 008)

A. Description

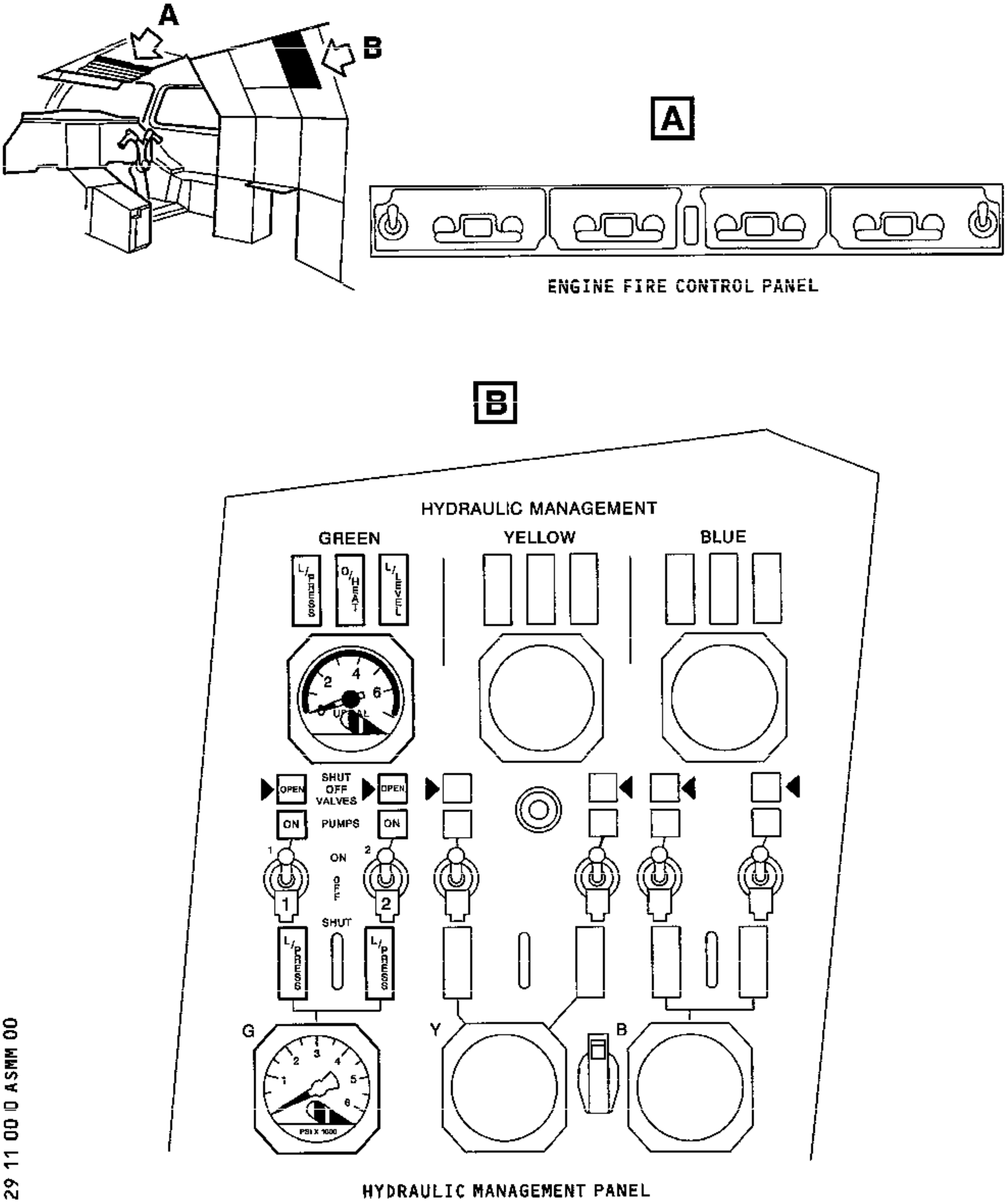
The de-aerator safety valve connects the tank de-aeration outlet port to ambient, thus enabling continuous de-aeration



Location Of Hydraulic and Engine Fire Control Panels
Figure 009

PRINTED IN ENGLAND

CNB 29 11 00 0 ASMA 00



Location of Hydraulic and Engine Fire Control Panels
Figure 009A

PRINTED IN ENGLAND

CMB 29 11 00 D ASMM 00

of the hydraulic fluid.

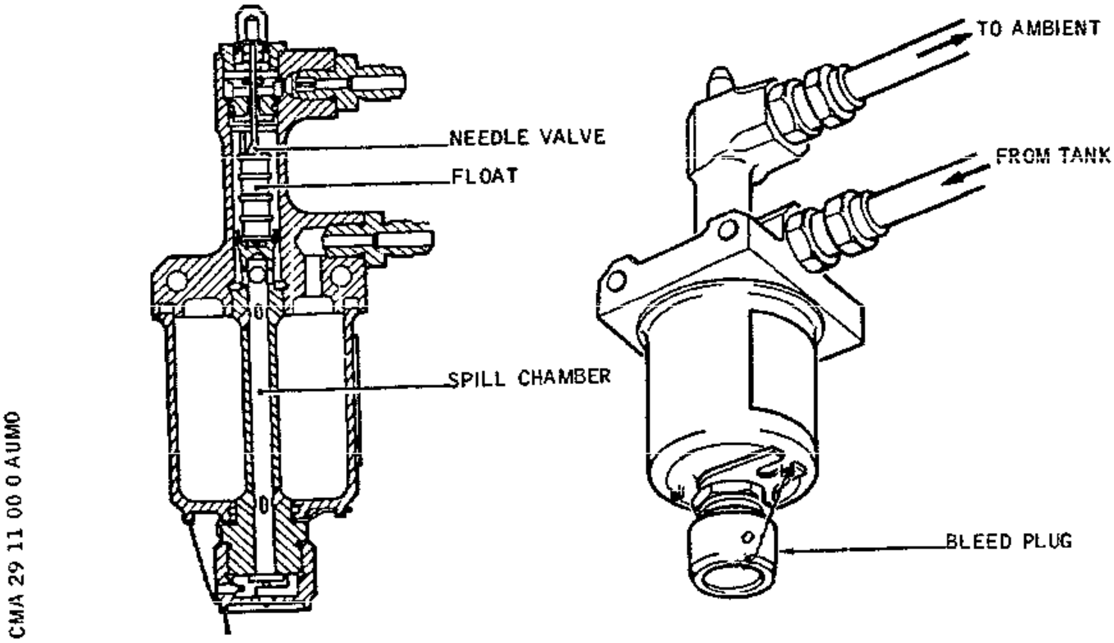
The valve consists of a housing with a bore at the top in which a float-valve rises and falls.

B. Operation

In the event of failure of the tank de-aerator, hydraulic fluid fills the body of the safety valve and lifts the float. The needle valve on the end of the float closes the port.

Beneath the float a spill chamber prevents the valve being closed by any globules of liquid.

PRINTED IN ENGLAND



Tank De-Aerator Safety Valve
Figure 008

9. Operation
R ON A/C 001-006 (Ref. Fig. 009)
R ON A/C 007-007 (Ref. Fig. 009A)

A. The components composing the Green system have the following functions:

PRINTED IN ENGLAND

INTENTIONALLY BLANK

(1) The hydraulic tank supplies fluid through heat exchangers and shut-off valves, to two self-regulating hydraulic pumps. These supply the various services with hydraulic fluid at 4 000 psi (275 bars) pressure, via micronic filters and non-return valves.

(2) A free-moving piston-type hydraulic accumulator installed at the manifold absorbs pressure surges and provides the extra pressure required to compensate for pump response time, when a substantial, instantaneous power supply is required for the services or servo-control units.

(3) The hydraulic tank is pressurized to 65 psi (4.5 bars) in order to avoid pump cavitation. Its maximum volume is 7.1 US gal (5.9 Imp. gal, 27 litres) and its normal fill quantity is 4 US gal (3.3 UK gal, 15 litres).

Any drop in pressurizing air pressure, any fluid overheat or low level conditions are indicated on the Flight Engineer's HYDRAULIC MANAGEMENT panel.

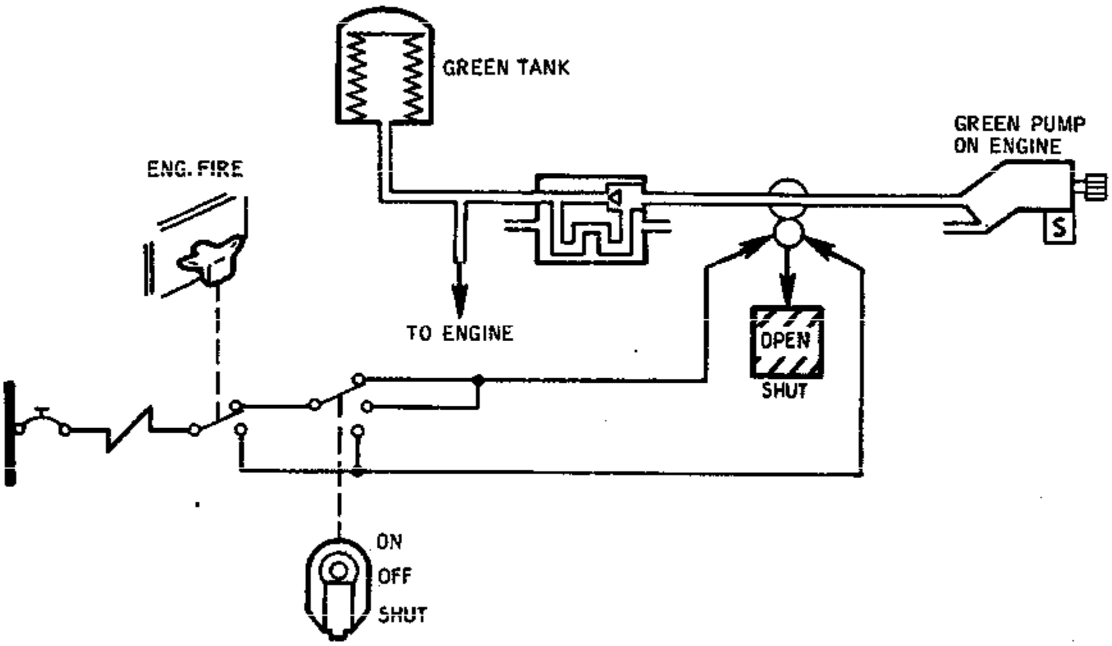
(4) The hydraulic fluid/fuel heat exchangers incorporated in the suction line enable fluid temperature in the system to be kept at an acceptable level of 203 to 221°F (95 to 105°C). The exchangers operate when fluid temperature exceeds 140°F (60°C) or when pump output is less than 9.25 US gal/min. (7.7 Imp. gal/min., 35 litres/min.).

(5) In the event of an engine fire, shut-off valves on the suction line, located in the wing outside the nacelle, cut off the hydraulic fluid supply. Each valve is operated by an electric motor controlled by a 3-position ON, OFF, SHUT switch on the Flight Engineer's panel :

ON, OFF position : shut-off valve open
SHUT position : shut-off valve closed.

The SHUT position can only be obtained after the sealed guard on the switch has been raised.

In the event of an engine fire, actuation of the relevant ENG FIRE handle causes the shut-off valve(s) to close. A magnetic indicator on the Flight Engineer's panel shows the position of the shut-off valve (OPEN or SHUT). During valve transit the de-energized indicator is cross-hatched.
(Ref. Fig. 010)



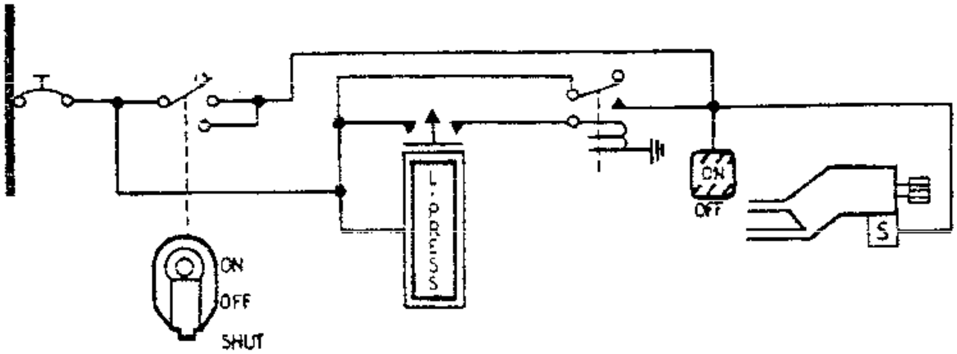
Shut-off Valve Control and Indication
Figure 010

(6) The two self-regulating pumps driven by engines 1 and 2 accessory gearboxes supply a pressure of 4000 psi (275 bars) and can provide a nominal delivery of 34.34 US gal/min. (28.60 Imp. gal/min., 130 litres/ min.). Circulation of recuperated return leakage ensures cooling and lubrication of the pump.

Each pump has a solenoid-controlled depressurizing system. The solenoid is energized by the three-position ON, OFF, SHUT switch on the Flight Engineer's panel :

- In ON position the solenoid is not energized, and the pump is pressurized
- In OFF or SHUT position the solenoid is energized and the pump depressurized.

A magnetic indicator on the Flight Engineer's panel indicates whether the pump is pressurized or de-pressurized (it displays ON or OFF respectively). (Ref. Fig. 011)



CMA 29 11 00 0 BCM0

Control and Indication of Green System Pumps
Figure 011

(7) The suction, delivery and case drain hoses are composed of two concentric reinforced pipes. The hydraulic fluid normally flows through the inner pipe. In the event of leakage it passes into the outer pipe.

A mechanical check device fitted on the hose connection enables the condition of the inner pipe to be checked.

On the pump HP delivery hose any fluid leakage in the inner pipe is drained off into the pump suction line.

After SB 29-045-02 For A/C 001-007,

(7) Not applicable
R On A/C 001-005

R After SB 29-041 For A/C 001-005

R (7) Pulse dampers installed on hydraulic pump delivery
R lines reduce pressure surges in magnitude.

(8) A pressure switch preset to 2030.5 psi (140 bars) is mounted in parallel with the delivery line of each pump to indicate any pump failure.

(9) A non-return valve prevents any back pressure on the pump should the engine or the pump itself shut down. It also maintains the pressure of the other pump in the system.

(10) Delivery pressure signals are transmitted to an indicator on the Flight Engineer's panel by a pressure transmitter mounted in parallel with the servo-control selector supply line.

(11) A pressure relief and manual unloading valve preset to 4583 psi (316 bars), and mounted on the manifold, protects the system from excess pressure due to thermal expansion of the fluid, or to a malfunction of the pump regulation system.

The manually actuated unloading device enables the hydraulic system to be depressurized during ground maintenance or trouble shooting work.

(12) All services and pump case-drain returns to the tank pass through non-return valves and a 3-micron filter.

(13) A valve fitted on each LP and HP filter allows the filter element to be removed without the tank having to be drained.

(14) The system is self-bleeding and no special bleeding procedure is required when equipment is changed. Pressurization of the system and a component functional test are sufficient to eliminate any air.

(15) The tank is filled on the ground through a ground connector and an LP filter.

(16) Two ground connectors incorporating self-sealing valves enable system pressurization and testing to be carried out using ground power units.

(17) Self-sealing valves enable rapid disconnection of the hydraulic lines during removal of an engine.

10. Electrical Power Supply

Power is supplied to the control and indicating circuits by the essential busbars.
The busbars and the panels on which they are located, are listed in the following chart :

SERVICE	BUSBAR		C/B PANEL
ENG 2 SHUT OFF VALVES CONT	No.1 ESSENTIAL	115 VAC 5X	2-213
GRND TANK CONTENTS IND	A MAIN	26 VAC 12X	13-215
HYD PUMP CONTROL	A MAIN	28 VDC 1P	15-215
SHUT OFF VALVES IND	B MAIN	28 VDC 2P	15-216
ENG 1 SHUT OFF VALVES CONT	No.2 ESSENTIAL	115 VAC 6X	15-216
BLUE GRN L.L, L.P, O/HEAT IND	B MAIN	28 VDC 2P	15-216
**ON A/C ALL			
HYD FLUID TEMP IND	A MAIN	28 VDC 1P	15-215

GREEN SYSTEM - TROUBLE SHOOTING

WARNING : MAKE CERTAIN THAT THE POSITIONS OF NOSE AND MAIN GEAR DOORS CORRESPOND WITH THE ACTUAL POSITIONS OF THE RESPECTIVE OPERATING HANDLES.
HANDLE LOCKED, INDICATOR PLATE SHOWING WHITE : DOORS CLOSED.
HANDLE LOCKED, INDICATOR PLATE SHOWING RED : DOORS OPEN.

MAKE CERTAIN THAT THE LANDING GEAR POSITION INDICATED ON THE GEARS POSITION INDICATING UNIT CORRESPONDS WITH THE ACTUAL POSITION OF THE LANDING GEAR.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE MAKE CERTAIN THAT THE TRAVEL RANGES OF THE CONTROL SURFACES ARE CLEAR.

BEFORE PRESSURIZING HYDRAULIC SYSTEMS, CHECK THAT ALL CONTROLS ARE SET TO CORRESPOND WITH THE ACTUAL POSITION OF THE SERVICES THEY OPERATE.

MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

OBSERVE THE ELECTRICAL SAFETY PRECAUTIONS DESCRIBED IN CHAPTER 24-00-00, SERVICING.

1. General

In order to obtain rapid trouble shooting of hydraulic systems, fault analysis is divided in two parts :
- Trouble shooting with the engines shut down
- Trouble shooting with the engines operating

Procedure described below deals only with pump 1 system ; for pump 2 system transpose indications in parentheses.
The defect can be isolated with the aid of the trouble shooting procedures and traced through OK and NOT OK paths to the appropriate charts or other specified rectification action as may be necessary. If a defect occurs perform the appropriate rectification action, then repeat the operation at which the defect was encountered to ensure the operation is OK.
Bracketed numbers in the procedures and charts indicate items on the component identification table (Ref. Table 101).
The table provides information, including component location required for rectification. All procedures dealing with trouble shooting are based on the assumption that electrical wiring is serviceable, all associated circuit breakers are set and electrical power is available unless otherwise stated. If the fault is not rectified check the wiring in accordance with the Wiring Diagram Manual (Ref. Table 101).

2. Prepare

A. Equipment and Materials

DESCRIPTION	PART NO.
Electrical Ground Power Unit	

B. Check that the following circuit breakers are set :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
ENG 1 SHUT-OFF-VALVES CONT	2-213	W 3	F15
GRN SYS PRESS IND		1D 21	C15
BLUE SYS PRESS IND		3D 21	D15
ENG 2 SHUT-OFF-VALVES CONT		W 7	B15
ENG 4 SHUT-OFF-VALVES CONT	4-213	W 8	C10
ENG 3 SHUT-OFF-VALVES CONT		W 4	D10
YELL SYS PRESS IND		2D 21	E10
GRN TANK CONTENTS IND	13-215	D 41	E 8
BLUE TANK CONTENTS IND		D 43	F 8
HYD TANK AIR COMP SUP		M 601	G 7
YELL TANK CONTENTS IND	13-216	D 42	B12
HYD GRND CHECK OUT PUMP CONT	14-216	M 626	A16
ENG 2 YELL PUMP CONT. IND	15-215	M 311	E 8
ENG 4 YELL PUMP CONT. IND		M 312	B 9
YELL LL.LP O/HEAT IND		G 261	C 9
ENG 1 GRN PUMP CONT. IND		M 271	D 6
ENG 2 GRN PUMP CONT. IND		M 272	D 7
HYD TANKS COMPR CONT		M 602	D 8
YELL PUMPS AUTO ON LOAD CONT		M 341	E 6
ENG 3 BLUE PUMP CONT. IND		M 342	E 7
ENG 4 BLUE PUMP CONT. IND		M 343	E 8
ENG 1 AND 2 SHUT-OFF-VALVES IND	15-216	W 5	C18

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
ENG 3 AND 4 SHUT-OFF-VALVES IND		W 6	C19
BLUE LL.LP O/HEAT IND		G 262	D19
GRN LL.LP O/HEAT IND		G 263	D20
HYD GRND CHECK OUT SEL VALVE CONT		M 626	F22

C. Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing).

D. On Flight Engineer's HYDRAULIC MANAGEMENT panel check that ON OFF SHUT control switches are in the following positions.

Switch : ON OFF SHUT-GREEN in ON position.
Switch : ON OFF SHUT-BLUE in ON position.
Switch : ON OFF SHUT-YELLOW in AUTO position.

E. On master warning panel check that ;

```
**************************************
*HYD warning light is illuminated. If*
**************************************------------------------------
       ||             |              |Ref29-11-00 Trouble shooting|
       OK             NOT OK---------|   29-12-00                 |
       ||                            |   29-21-00                 |
       ||                            ------------------------------
       ||
```

F. On Flight Engineer's HYDRAULIC MANAGEMENT panel, check that :

```
**************************************
*Tank L/PRESS caption lights are off.*
*If,                                 *
**************************************
       ||             |              ------------------------------
       OK             NOT OK---------|Ref29-31-00 Trouble shooting|
       ||                            ------------------------------
       ||
**************************************
*O/HEAT caption lights are off. If,  *
**************************************
       ||             |              ------------------------------
       OK             NOT OK---------|Ref29-33-00 Trouble shooting|
       ||             |              ------------------------------
**************************************
*L/LEVEL caption lights are off. If, *
**************************************
       ||             |              ------------------------------
       OK             NOT OK---------|Ref29-32-00 Trouble shooting|
       ||                            ------------------------------
       ||
**************************************
* Transmitters indicate a normal     *
* level. If                          *
**************************************
       ||             |
       ||             |              ------------------------------
       ||             NOT OK---------|Ref29-32-00 Trouble shooting|
       ||                            ------------------------------
       ||
       ||
       ||
       OK
       ||
       ||
       ||
       ||
```


Printed in England

```
**************************************
* SHUT OFF VALVES magnetic indicators*
* display OPEN. If,                  *
**************************************
        ||            |
        OK            NOT OK-----------
        ||                            |
        ||                            |
**************************************|
* Green and Blue system PUMPS magne- *|
* tic indicators display ON and      *|
* Yellow system PUMPS magnetic indi- *|
* cators display OFF. If,            *|
**************************************|
        ||            |               |
        OK            NOT OK----------|
        ||                            |
        ||                            |
**************************************|
* Pump L/PRESS caption lights are    *|
* illuminated. If,                   *|
**************************************|
        ||            |               |
        OK            NOT OK----------|
        ||                            |
**************************************|
* On pressure indicators, warning    *|
* Flags are not visible. If,         *|
**************************************|
                      |               |   -------------------------
                      |               |  | Ref 29-11-00            |
                      |               |  |     29-12-00            |
                      NOT OK-------------|     29-21-00            |
                                         |    Trouble shooting     |
                                          -------------------------
```

3. Trouble shooting (engines shut down)

```
*****************************************************
* On master warning panel HYD warning light is      *
* illuminated. If,                                  *
*****************************************************
   ||      |   ----------------------------------------------------
   OK   NOT OK-| HYD warning light is not illuminated              |
   ||          | Ref chart 101                                     |
   ||          ----------------------------------------------------
   ||
*****************************************************
* On Flight Engineer's HYDRAULIC MANAGEMENT panel    *
* SHUT OFF VALVE 1 (2) GREEN magnetic indicator      *
* displays OPEN. If,                                 *
*****************************************************
   ||      |   ----------------------------------------------------
   ||      |   | SHUT OFF VALVE 1 (2) GREEN magnetic indicators   |
   ||   NOT OK-| are cross hatched.                               |
   ||      |   | Check circuit breaker W5 (15)                    |
   OK      |   ----------------------------------------------------
   ||      |   ----------------------------------------------------
   ||      |   | SHUT OFF VALVE 1 (2) GREEN magnetic indicator    |
   ||   NOT OK-| is still cross-hatched.                          |
   ||          | Ref chart 102                                    |
   ||          ----------------------------------------------------
   ||
*****************************************************
* On HYDRAULIC MANAGEMENT panel PUMPS 1 (2) GREEN    *
* magnetic indicator display ON. If                  *
*****************************************************
   ||      |
   ||      |   ----------------------------------------------------
   OK   NOT OK-| PUMPS 1 (2) GREEN magnetic indicator displays    |
   ||          | Ref chart 103                                    |
   ||          ----------------------------------------------------
*****************************************************
* On HYDRAULIC MANAGEMENT panel pump 1 (2) L/PRESS   *
* caption light is illuminated. If,                  *
*****************************************************
   ||      |   ----------------------------------------------------
   OK   NOT OK-| Pump 1 (2) L/PRESS caption light is off          |
   ||          | Ref : chart 104                                  |
   ||          ----------------------------------------------------
   ||
   ||
   ||
   ||
   ||
   ||
```

```
*****************************************************
* On HYDRAULIC MANAGEMENT panel, on pressure        *
* indicator, warning flag is not visible. If,       *
*****************************************************
    ||      |    ---------------------------------------------------
    OK      NOT OK-| Warning flag is visible on pressure indicator  |
    ||      |      | Ref chart 105                                  |
    ||      |    ---------------------------------------------------
    ||      |
*****************************************************
* On HYDRAULIC MANAGEMENT panel press pump 1 (2)    *
* L/PRESS caption light                             *
* PUMP 1 (2) magnetic indicator displays OFF. If,   *
*****************************************************
    ||      |    ---------------------------------------------------
    OK      NOT OK-| PUMPS 1 (2) magnetic indicator still displaysON|
    ||             | Ref chart 106                                  |
    ||           ---------------------------------------------------
    ||
    ||
*****************************************************
* On HYDRAULIC MANAGEMENT panel place control switch*
* 1 (2) in OFF position. PUMPS 1 (2) magnetic       *
* indicator displays OFF. If,                       *
*****************************************************
    ||      |    ---------------------------------------------------
    OK      NOT OK-|PUMPS 1 (2) magnetic indicator still displays ON|
    ||             |Ref chart 107                                   |
    ||           ---------------------------------------------------
    ||
*****************************************************
* On HYDRAULIC MANAGEMENT panel place control switch*
* 1 (2) in SHUT position. SHUT OFF VALVE 1 (2)      *
* magnetic indicator 15 cross hatched then displays *
* SHUT. If,                                         *
*****************************************************
    ||      |    ---------------------------------------------------
    ||      |      |SHUT OFF VALVE 1 (2) magnetic indicator is      |
    ||      NOT OK-|still cross hatched.                            |
    ||      |      |Ref chart 108                                   |
    ||      |    ---------------------------------------------------
    ||      |    ---------------------------------------------------
    ||      |      |SHUT OFF VALVE 1 (2) magnetic indicator still   |
    ||      NOT OK-|displays OPEN                                   |
    ||      |      |Ref chart 109                                   |
    ||      |    ---------------------------------------------------
    OK
    ||
    ||
```

```
****************************************************
* On HYDRAULIC MANAGEMENT panel place control switch*
* 1 (2) in ON position. SHUT OFF VALVE 1 (2)       *
* magnetic indicator is cross hatched then displays *
* OPEN. If,                                         *
****************************************************
    ||       |   ----------------------------------------------------
    ||       |   | SHUT OFF VALVE 1 (2) magnetic indicator is      |
    ||    NOT OK-| still cross hatched.                             |
    ||       |   | Ref chart 110                                    |
    OK       |   ----------------------------------------------------
    ||       |   ----------------------------------------------------
    ||       |   | SHUT OFF VALVE 1 (2) magnetic indicator still   |
    ||    NOT OK-| displays SHUT.                                   |
    ||       |   | Ref chart 111                                    |
    ||       |   ----------------------------------------------------
****************************************************
* On ENGINE FIRE CONTROLS overhead panel pull engine*
* 1 (2) shut down handle.                           *
* On HYDRAULIC MANAGEMENT panel SHUT OFF valve 1 (2)*
* magnetic indicator displays SHUT. If,             *
****************************************************
    ||       |   ----------------------------------------------------
    ||       |   | SHUT OFF VALVE 1 (2) magnetic indicator still   |
    OK    NOT OK-| displays OPEN                                    |
    ||           | Replace engine shut down handle 1W160(16)(2W160|
    ||           | (17)                                             |
    ||           ----------------------------------------------------
****************************************************
* On overhead panel push engine 1 (2) shut down     *
* handle. On HYDRAULIC MANAGEMENT panel SHUT OFF    *
* VALVE 1 (2) magnetic indicator changes to OPEN.   *
* If,                                               *
****************************************************
    ||       |   ----------------------------------------------------
    ||       |   |SHUT OFF VALVE 1 (2) magnetic indicator displays|
    OK    NOT OK-|SHUT.Replace engine shut down handle 1W160 (16) |
    ||           |2W160 (17)                                       |
    ||           ----------------------------------------------------
***************************************************
* Pressurize hydraulic systen through ground       *
* pressurizing system (Ref 29-11-00, Servicing)    *
* On HYDRAULIC MANAGEMENT panel hydraulic          *
* system pressure reading normal. If,              *
***************************************************
    ||       |   ----------------------------------------------------
    OK    NOT OK-|Hydraulic system pressure not correct            |
    ||           |Ref chart 112                                    |
    ||           ----------------------------------------------------
    ||
    ||
```

4. Trouble shooting (Engines operating)

```
****************************************************
* On HYDRAULIC MANAGEMENT panel pump 1 (2) L/PRESS *
* caption lights are off, If,                      *
****************************************************
    ||      |    ---------------------------------------------------
    OK     NOT OK-|Pump 1 (2) L/PRESS caption light is illuminated |
    ||            |Ref chart 113                                   |
    ||           ---------------------------------------------------
****************************************************
* On HYDRAULIC MANAGEMENT panel system pressure read*
* on indicator is normal. If,                      *
****************************************************
    ||      |    ---------------------------------------------------
    ||      |    | System pressure read on indicator is abnormally|
    OK     NOT OK-| high.                                          |
    ||           | Ref chart 114                                  |
                 ---------------------------------------------------
****************************************************
* On HYDRAULIC MANAGEMENT panel place pump 1 control*
* switch in OFF position.                          *
* On this panel L/PRESS 1 caption light comes on   *
* and on master warning panel HYD warning light    *
* comes on. If,                                    *
****************************************************
    ||      |    ---------------------------------------------------
    ||      |    | L/PRESS 1 caption light and HYD warning light  |
    ||     NOT OK-| do not come on                                 |
    ||      |    | Ref chart 115                                  |
    ||      |    ---------------------------------------------------
    OK      |    ---------------------------------------------------
    ||      |    | L/PRESS1 caption light comes on and HYD warning|
    ||     NOT OK-| light does not come on                         |
    ||           | Ref 33-15-00, Trouble shooting.                |
    ||           ---------------------------------------------------
    ||
    ||
    ||
```

```
    ||
    ||
    ||
    ||
    ||
    ||
    ||
    ||
    ||
    ||
*****************************************************
* On HYDRAULIC MANAGEMENT panel place pump 1 control*
* switch in ON position and pump 2 switch in OFF    *
* position                                          *
* On this panel L/PRESS 2 caption light comes on and*
* on master warning panel HYD warning light comes   *
* on. If,                                           *
*****************************************************
    ||       |    -----------------------------------------------
    ||       |    | L/PRESS 2 caption light and HYD warning light |
    ||    NOT OK-| do not come on.                                |
    ||       |    | Ref Chart 116                                 |
    ||       |    -----------------------------------------------
    OK       |    -----------------------------------------------
    ||       |    | L/PRESS 2 caption light comes on and HYD      |
    ||    NOT OK-| warning light does not come on                 |
    ||       |    | Ref 33-15-00, Trouble Shooting                |
    ||       |    -----------------------------------------------
    ||       |
*****************************************************
* On HYDRAULIC  MANAGEMENT panel place pump 2 switch*
* in ON position. Test is conclusive, Green         *
* hydraulic system is operational.                  *
*****************************************************
```

PRINTED IN ENGLAND

```
* * * * * * * * * * * * * * * * * * * *
* HYD WARNING LIGHT IS NOT ILLUMINATED*
* * * * * * * * * * * * * * * * * * * *

* * * * * * * * * * * * * * * * * * * *
* On HYDRAULIC MANAGEMENT panel press *
* one O/HEAT caption light.          *
* HYD warning light comes on. IF,    *
* * * * * * * * * * * * * * * * * * * *
          |        |
          |        |
         OK       NOT OK---- HYD warning light does
          |        |         not come on (on master
          |        |         warning panel).
          |        |         Ref. 33-15-00 Trouble
          |        |         Shooting.
* * * * * * * * * * * * * * * * * * * *
* Release O/HEAT caption light       *
* HYD warning light goes off.        *
* Warning system is correct.         *
* * * * * * * * * * * * * * * * * * * *
```

Chart 101

```
*******************************************
* SHUT OFF VALVE 1 (2) BLUE MAGNETIC      *
* INDICATOR is cross hatched              *
*******************************************

*******************************************
* On panel 2-213 trip circuit breaker     *
* W03 (W07)Position F15 (B15) and on panel*
* 15-216 trip circuit breaker W5 (W05)    *
* PositionC 18. In zone 531 BT (532 CT)   *
* disconnect electrical connector from    *
* shut off valve W19(W23)                 *
* On connector W 19 A (W 23 A) shunt      *
* terminals A and D.                      *
* Set circuit breaker W05. SHUT OFF VALVE *
* 1 (2) magnetic indicator changes to OPEN*
*******************************************
        |              |                  -------------------------
        |              |                 | Replace SHUT OFF VALVE|
        OK             NOT OK-------------| magnetic indicator    |
        |                                | W 11 (1) (W 15 [2])   |
        |                                 -------------------------
        |                                 -------------------------
        ----------------------------------|Replace shut off valve |
                                          |W19 (20) (W23 [21])    |
                                          -------------------------
```

Chart 102

```
***************************************-------------------------------
* PUMPS 1 (2)GREEN MAGNETIC INDICATOR*| GROUND EQUIPMENT REQUIRED   |
* DISPLAYS OFF                        *-------------------------------
**************************************| DESCRIPTION        PART NO  |
                                      -------------------------------
                                      | MULTIMETER                  |
                                      -------------------------------


**************************************
* On RH HYD RLY BOX panel 2-123 on   *
* connector UT 1837-10 check voltage *
* between terminal A(C) and ground.If*
**************************************-------------------------------
       |            |                 | Replace caption light       |
       0V           28V---------------| M 292 (7) (M 291[8])        |
       |                              -------------------------------
**************************************
* On panel 15-215, Trip circuit      *
* breaker M 271 (M 272) Position D6  *
* (D7). PUMPS 1 (2) GREEN magnetic   *
* indicator changes to ON. If        *
**************************************
       |            |                 -------------------------------
       OK           NOT OK------------| Replace magnetic indicator  |
       |                              | M292 (1) (M291 [2])         |
       |                              -------------------------------
**************************************
* On RH HYD RLY BOX panel 2-213      *
*remove relay M 297(M 291). On       *
* panel 15-215 set circuit breaker   *
* M 271 (M272) Position D 6 (D 7)    *
* PUMPS 1(2) magnetic indicator still*
* displays ON. If,                   *
**************************************
       |            |                 -------------------------------
       |            NOT OK------------|Replace switch M 275(5)      |
       |                              |(M 274 [6])                  |
       |                              -------------------------------
       |                              -------------------------------
       |                              | Replace relay M 297 (18)    |
       OK-----------------------------| (M 296[19])                 |
                                      -------------------------------
```

Chart 103

```
*************************************
* PUMP 1(2) L/PRESS CAPTION LIGHT   *
* IS OFF                            *
*************************************

*************************************
* On HYDRAULIC MANAGEMENT panel press*
* L/PRESS 1 (2) GREEN caption light. *
* PUMPS 1 (2) magnetic indicator    *
* changes to OFF. If,               *
*************************************
        |              |              ------------------------------
        OK             NOT OK---------| Check circuit breaker M271 |
        |                             | (13) (M272 [14])           |
        |                             ------------------------------
*************************************
* On panel 15-215 trip circuit      *
* breaker M 271 (M 272) Position D6 *
* (D7)                              *
* Disconnect connector of pressure  *
* switch M 277(M 277) zone 532 AT   *
* (531 AT)                          *
* Shunt terminals A and C of        *
* connector M277A                   *
* Set circuit breaker M 271 (M 272) *
* L/PRESS caption light of pump 1 (2)*
* comes on. If,                     *
*************************************
        |              |              ------------------------------
        |              NOT OK---------| Replace caption light      |
        |                             | M 292 (7) (M 291 (8)       |
        |                             ------------------------------
        |                             ------------------------------
        |                             | Replace pressure switch    |
        OK----------------------------| M 277 (22) of pump 1 (M 277|
                                      | (23) of pump 2)            |
                                      ------------------------------
```

Chart 104

```
*************************************
* ON PRESSURE INDICATOR WARNING FLAG *
* IS VISIBLE                         *
*************************************

*************************************
* On panel 2-213 check circuit       *
* breaker 1D 21 Position C15. If     *
*************************************
        |              |            ------------------------------
        |              |            | Replace circuit breaker    |
        |              NOT OK-------| 1 D 21 (10)                |
        |                           ------------------------------
        |                           ------------------------------
        |                           | Replace pressure indicator |
        OK--------------------------| 1D 22 (9)                  |
                                    ------------------------------
```

Chart 105

```
**************************************-------------------------------
* PUMPS 1(2) MAGNETIC INDICATOR still*| GROUND EQUIPMENT REQUIRED   |
* DISPLAYS ON                        *-------------------------------
**************************************| DESCRIPTION         PQRT NO |
                                      -------------------------------
                                      | MULTIMETER                  |
                                      -------------------------------

**************************************
* On HYDRAULIC MANAGEMENT panel press*
* and hold during test L/PRESS 1 (2) *
* caption light.                     *
* On LH HYD BOX panel 2-123, on      *
* connector UT 1837-10 check voltage *
* between terminal A (C) and ground. *
* If,                                *
**************************************
        |              |              -------------------------------
       28V             0V-------------| Replace caption light M     |
        |                             | 292 (7) (M 291 (8)          |
        |                             -------------------------------
**************************************
* Open panel 3.214, on terminal strip*
* UM 2154-E check voltage between    *
* terminal 7 (2) and ground.         *
* (L/PRESS 1 (2) caption light       *
* held pressed). If,                 *
**************************************
        |              |              -------------------------------
        |              0V-------------| Replace relay M 297 (18)    |
        |                             | (M 296 [19])                |
        |                             -------------------------------
        |                             -------------------------------
        |                             | Replace magnetic indicator  |
       28V----------------------------| M 289 (3) (M 288 [4])       |
                                      -------------------------------
```

Chart 106

```
*************************************-------------------------------
* PUMPS 1(2) MAGNETIC INDICATOR STILL*| GROUND EQUIPMENT REQUIRED  |
* DISPLAYS ON                        *-------------------------------
*************************************| DESCRIPTION       PART NO  |
                                     -------------------------------
                                     | MULTIMETER                 |
                                     -------------------------------

*************************************
* Open panel 3-214; on terminal strip*
* UM 2154-E check voltage between    *
* terminal 7 (2) and ground. If,     *
*************************************
        |             |              -------------------------------
        |            0V-------------| Replace switch M 275 (5)   |
        |                           | (M274 [6])                 |
        |                            -------------------------------
        |                            -------------------------------
        |                           | Replace magnetic indicator |
       28V--------------------------| M 289 (3) (M 288 [4])      |
                                     -------------------------------
```

Chart 107

```
*************************************---------------------------------
* SHUT OFF VALVE 1 (2) MAGNETIC     *| GROUND EQUIPMENT REQUIRED     |
* INDICATOR IS STILL CROSS HATCHED  *---------------------------------
*************************************| DESCRIPTION         PART NO  |
                                     ---------------------------------
                                     | MULTIMETER                    |
                                     ---------------------------------

*************************************
* On panel 2-213 Trip circuit breaker*
* W03(W07)Position F15 (B15) and on *
* panel 15-216 trip circuit breaker *
* W05(W05)Position C 18. In zone 531 *
* BT (532 CT) disconnect electrical *
* connector of shut off valve W 19  *
* (W 23). On connector W19 A (W 23 A)*
* on shut off valve check continuity *
* between pins E and D. If,         *
*************************************
        |              |             ---------------------------------
        |              |             | Replace shut off valve W 19|
        |              NOT OK--------| (20) (W23 [21])               |
        |                            ---------------------------------
        |                            ---------------------------------
        |                            | Replace magnetic indicator |
        OK---------------------------| W11 (1) (W15 [2])             |
                                     ---------------------------------
```

Chart 108

Printed in England

SHUT OFF VALVE 1 (2) MAGNETIC INDICATOR STILL DISPLAYS OPEN

GROUND EQUIPMENT REQUIRED	
DESCRIPTION	PART NO
MULTIMETER	

In zone 531 BT (532 CT), on shut off valve drive motor, check position indicator.
Red indication is visible. If,

- OK:
  On panel 2-213 trip circuit breaker W03 (W07)Position F 15 (B15) and on panel 15-216 trip circuit breaker W05(W05)PositionC18.In zone 531 BT (532CT) disconnect electrical connector of shut off valve W19 (W23). Set circuit breaker W03(W07) Between terminals C and B of connec-tor W19A (W23A) check voltage. If,
  - 28V: Replace shut off valve W 19 [20] [23] [21]
  - 0V: Replace switch M275 [5](M274[6])
- NOT OK:
  On panel 4-213 trip circuit breaker W03(W07)PositionF15 (B15) and on panel 15-216 Trip circuit breaker W05 (W05)Position C18. In zone 531 BT (532 CT) disconnect electrical connector of shut off valve W19 (W23). On connector W19A (W23A), on shut off valve check continuity between pins E and D. If,
  - NOT OK: Replace shut off valve W19 [20](W23 [21])
  - OK: Replace indicator W11 [1] (W15 [2])

Chart 109

```
**************************************-------------------------------
* SHUT OFF VALVE 1 (2) MAGNETIC      *| GROUND EQUIPMENT REQUIRED  |
* INDICATOR IS STILL CROSS HATCHED   *-------------------------------
**************************************| DESCRIPTION       PART NO  |
                                      -------------------------------
                                      | MULTIMETER                 |
                                      -------------------------------

**************************************
* On panel 2-213 trip circuit        *
* breaker W03(W07)Position F 15 (B15)*
* and on panel 15-216 trip circuit   *
* breaker W05(W05)Position C18. In   *
* zone 531BT (532CT) disconnect      *
* electrical connector of shut off   *
* valve W19 (W23). Set circuit       *
* breaker W03 (W07). Check voltage   *
* between terminals A and B of       *
* connector W19 A(W23A). If,         *
**************************************
                                      -------------------------------
        28V            0V             | Replace switch M 275 (5)   |
                                      | (M 274 (6)                 |
                                      -------------------------------
**************************************
* On connector W19 A (W 23 A), on    *
* shut off valve check continuity    *
* between terminals F and D. If      *
**************************************
        |              |              -------------------------------
        |              |              | Replace shut off valve W19 |
        |              NOT OK---------| [20] (W 23 [21])           |
        |                             -------------------------------
        |                             -------------------------------
        |                             | Replace indicator W11 (1)  |
        OK----------------------------| (W 15 [2])                 |
                                      -------------------------------
```

Chart 110

```
**************************************-------------------------------
* SHUT OFF VALVE 1 (2) MAGNETIC      *| GROUND EQUIPMENT REQUIRED   |
* INDICATOR STILL DISPLAYS SHUT      *-------------------------------
**************************************| DESCRIPTION        PART NO  |
                                      -------------------------------
                                      | MULTIMETER                  |
                                      -------------------------------

**************************************
* On panel 2-213 trip circuit breaker*
* W03(W07)Position F 15 (B 15) and   *
* on panel 15-216 trip circuit       *
* breaker W05(W05)Position C18.      *
* In zone 531 BT (532 CT) disconnect *
* electrical connector of shut off   *
* valve W19 (W23). Set circuit       *
* breaker W03(W07). Check voltage    *
* between terminals A and B of       *
* connector W19A (W23A). If,         *
**************************************
        |              |               -------------------------------
        |              0V-------------| Replace switch M275 (5)     |
        |                             | (M274 (6)                   |
        |                              -------------------------------
        |                              -------------------------------
        |                             | Replace shut off valve W19  |
       28 V---------------------------| [20] (W23 [21])             |
                                       -------------------------------
```

Chart 111

```
  ************************************
  * HYDRAULIC SYSTEM PRESSURE IS     *
  * INCORRECT                        *
  ************************************

  ************************************
  * On panel 2-213 trip circuit      *
R * breakers 1D 21, Position C 15 and *
R * 3D 21 Position D 15.             *
  * Interchange the two Green and    *
  * Blue pressure indicators.        *
  * Set circuit breakers 1D21 and 3D21.*
  * Pressurize Green hydraulic system *
  * using electric pumps (Ref 29-11-00 *
  * Servicing)                       *
  * Pressure is normal. If,          *
  ************************************
          |              |
          |              |         ------------------------------
          |              |         | Replace pressure indicator |
          |              OK--------| 1D22 (9)                   |
          |                        ------------------------------
          |
          |                        ------------------------------
          |                        | Replace pressure transmit- |
          NOT OK-------------------| ter 1 D 23 (26)            |
                                   ------------------------------
```

Chart 112

```
**************************************
* PUMP 1 (2) L/PRESS CAPTION LIGHT   *
* is ILLUMINATED (ENGINES OPERATING) *
**************************************

**************************************
* On HYDRAULIC MANAGEMENT panel place*
* ON-OFF-SHUT control switch of pump *
* (the L/PRESS caption light of which*
* is off) in OFF position.           *
* Pressure remains correct. If       *
**************************************
        |             |
        |             |                ------------------------------
        |             |                | Replace hydraulic pump M294|
        |             NOT OK-----------| (24) indicated by warning  |
        |                              ------------------------------
        |                              ------------------------------
        |                              | Replace pressure switch M  |
        OK-----------------------------| 277 (22)or(23) indicated by|
                                       | warning                    |
                                       ------------------------------
```

Chart 113

```
***************************************
* HYDRAULIC SYSTEM PRESSURE READ      *
* ON INDICATOR IS ABNORMALLY HIGH     *
***************************************


***************************************
* On HYDRAULIC MANAGEMENT panel place*
* ON-OFF-SHUT 1 control switch in OFF*
* position.                           *
* Indicated pressure is correct       *
***************************************
        |              |         ------------------------------
        |              |         | Replace hydraulic pump     |
        |              NOT OK----| (25) of engine 2           |
        |                        ------------------------------
        |                        ------------------------------
        |                        | Replace hydraulic pump     |
        OK-----------------------| (24) of engine 1           |
                                 ------------------------------
```

Chart 114

Printed in England

L/PRESS 1 CAPTION LIGHT AND HYD WARNING LIGHT DO NOT COME ON

GROUND EQUIPMENT REQUIRED	
DESCRIPTION	PART NO
MULTIMETER	

Engines shut down.
On HYDRAULIC MANAGEMENT panel place ON-OFF-SHUT 1 control switch in ON then in OFF position.
In zone 415 AB, Check operation of pressurizing solenoid (characteristic noise.)

- OK → Replace pressure switch M277 (22)
- NOT OK → On panel 15-215 trip circuit breaker M271 Position D6. Open panel 415 AB (Ref 71-00-00, Servicing) Disconnect connector M 294 of pump solenoid. Set circuit breaker M 271.Check voltage between terminals A and B of connector M294A
  - 28 V → Replace hydraulic pump M 294 (24)
  - 0V → Replace switch M275 (5)

Chart 115

L/PRESS 2 CAPTION LIGHT AND HYD WARNING LIGHT DO NOT COME ON

GROUND EQUIPMENT REQUIRED	
DESCRIPTION	PART NO
MULTIMETER	

Engines shut down
On HYDRAULIC MANAGEMENT panel place ON-OFF-SHUT 2 control switch in ON then in OFF position
In zone 426 AB Check operation of pressurizing solenoid (characteristic noise).

- OK → Replace pressure switch M277 (23)
- NOT OK → On panel 15-215 trip circuit breaker M 272 Position D6. Open panel 426 AB (Ref 71-00-00, Servicing) Disconnect connector M294 of pump solenoid. Set circuit breaker M272. Check voltage between terminals A and B connector M294A.
  - 28 V → Replace hydraulic pump M294 (25)
  - 0V → Replace switch M274 (6)

Chart 116

ITEM No. AND DESCRIPTION	ACCESS PANEL	PANEL/ ZONE	EQUIP. IDENT.	POSITION	MANUAL REF. MAINT. TOPIC	WIRING DIAGRAM
[1] SHUT OFF VALVE magnetic indicator		3-214	W 11	Flight Eng. panel	29-00-00 R/I	29-11-01
[2] SHUT OFF VALVE magnetic indicator		3-214	W 15	Flight eng. panel	29-00-00 R/I	29-11-01
[3] PUMPS magnetic indi= cator		3-214	M289	Flight Eng. panel	29-00-00 R/I	29-11-01
[4] PUMPS - magnetic indicator		3-214	M288	Flight eng. panel	29-00-00 R/I	29-11-01
[5] Control switch		3-214	M275	Flight eng. panel	29-00-00 R/I	29-11-01
[6] Control switch		3-214	M274	Flight eng. panel	29-00-00 R/I	29-11-01
[7] L/PRESS Caption light pump 1		3-214	M292	Flight eng. panel	29-00-00 R/I	29-11-01
[8] L/PRESS Caption Light pump 2		3-214	M291	Flight eng. panel	29-00-00 R/I	29-11-01
[9] Pressure Indicator		3-214	1D 22	Flight eng. panel	29-00-00 R/I	29-31-11
R [10] Circuit breaker		2-213	1D 21	C-15	24-50-00 R/I	29-11-01
[11] Circuit breaker		2-213	W 3	F-15	24-50-00 R/I	29-11-01
[12] Circuit breaker		2-213	W 7	B-15	24-50-00 R/I	29-11-01
[13] Circuit breaker		15-215	M271	D-6	24-50-00 R/I	29-11-01 29-11-01

ITEM No. AND DESCRIPTION	ACCESS PANEL	PANEL/ ZONE	EQUIP. IDENT.	POSITION	MANUAL REF. MAINT. TOPIC	WIRING DIAGRAM
[14] Circuit breaker		15-215	M272	D-7	24-50-00 R/I	29-11-01
[15] Circuit breaker		15-216	W 5	C-18	24-50-00 R/I	29-11-01
[16] Engine Shut down Handle No 1		4-211	1W160	Pilot's roof panel	26-22-11 R/I	26-22-01
[17] Engine Shut down Handle No2		4-211	2W160	Pilot's roof panel	26-22-11 R/I	26-22-01
[18] Depressu-rization Relay	123AB	2-123	M297		29-00-00 R/I	29-11-01
[19] Depressu-rization	123AB	2-213	M296		29-00-00 R/I	29-11-01
[20] Pump 1 shut off valve	532CT		W 19	wing upper surface	29-11-42 R/I	29-11-01
[21] Pump 2 shut off valve	531BT		W 23	wing upper surface	29-11-42 R/I	
[22] Pump No1 Pressure switch	532AT		M277		29-11-72 R/I	29-11-01
[23] Pump No2 Pressure switch	531AT		M277		29-11-72 R/I	29-11-01
[24] Depressu-rizing solenoid pump 1	415AB		M294		29-11-71 R/I	29-11-01
[25] Depressu-rizing Solenoid pump 2	426AB		M294		29-11-71 R/I	29-11-01

Printed in England

ITEM No. AND DESCRIPTION	ACCESS PANEL	PANEL/ ZONE	EQUIP. IDENT.	POSITION	MANUAL REF. MAINT. TOPIC	MANUAL REF. WIRING DIAGRAM
[26] Pressure transmitter	151DB	152	1D 23		29-00-00 R/I	29-31-11

Component Identification
Table 101

GREEN SYSTEM - SERVICING

1. General

   A. Procedure for bleeding hydraulic pump suction lines.

   B. Green system pressurization using hydraulic ground power unit.

   C. Green system pressurization using ground pressurizing system (electric pump).

   D. Green system depressurization.

2. Procedure for Bleeding Hydraulic Pump Suction Lines

   A. Equipment and Materials

DESCRIPTION	PART NO.
Transparent Vinyl Hose Adaptable to Shut-Off Valve Elbow Coupling	
Hydraulic Tank Pressurizing Equipment (Air Bottle with Pressure Reducing Valve)	
Container: Capacity approx. 5 litres (1.30 US Gal, 1.10 Imp. Gal)	
Corrosion Resistant Steel Lockwire, Dia. 0.040 in. (1.02 mm) Condition A	
Access Platform - 13 ft. 7 in. (4.06 m)	
Wing Protective Mat	
Hydraulic Fluid (Ref. 20-30-00, No.011)	
Electrical Ground Power Unit	

R B. Prepare

      (1) Position access platform and wing protective mat.

      (2) Open access doors on upper wing surface as follows :

         (a) No.1 engine - access door 532CT

(b) No.2 engine - access door 531BT.

(3) Open access door 153BB, depressurize Green system tank and connect tank pressurizing equipment to ground connector 0191.

(4) Make certain that the following circuit breakers are set :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
ENG 1 SHUT OFF VALVES CONT	2-213	W 03	F15
SHUT OFF VALVES IND	15-216	W 05	C18

(5) Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing).

(6) On Flight Engineer's HYDRAULIC MANAGEMENT panel, make certain that SHUT OFF VALVES-1-GREEN magnetic indicator displays OPEN.

(7) De-energize the aircraft electrical network (Ref. 24-41-00, Servicing).

C. Bleed

(1) Unscrew and remove blanking cap on bleed valve located on shut-off valve elbow coupling. Connect plastic hose to bleed valve and place other end in container provided.

(2) Pressurize hydraulic tanks to 1 bar (14.504 psi) (Ref. 29-13-00, Servicing).

(3) Open bleed valve and allow hydraulic fluid to flow into container until it no longer contains any air bubbles.

(4) Close shut-off valve bleed valve, wet torque with Product No.011 to between 35 and 49 lbf.in. (0.40 and 0.55 m.daN), then wirelock.

(5) Remove plastic hose, refit cap on bleed valve and wirelock.

(6) Wipe off all traces of fluid.

(7) Replenish tank as required (Ref. 12-12-29).

D. Close-Up

(1) Disconnect and remove tank pressurizing equipment.

(2) Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(3) Disconnect electrical ground power unit (Ref. 24-41-00, Servicing).

(4) Close access doors.

(5) Remove wing protective mat.

(6) Remove access platform.

3. Green System Pressurization Using Hydraulic Ground Power Unit

WARNING : MAKE CERTAIN THAT THE POSITIONS OF NOSE AND MAIN GEAR DOORS CORRESPOND WITH THE ACTUAL POSITIONS OF THE RESPECTIVE OPERATING HANDLES.
HANDLE LOCKED, INDICATOR PLATE SHOWING WHITE : DOORS CLOSED.
HANDLE LOCKED, INDICATOR PLATE SHOWING RED : DOORS OPEN.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE MAKE CERTAIN THAT THE TRAVEL RANGES OF THE CONTROL SURFACES ARE CLEAR.

BEFORE PRESSURIZING HYDRAULIC SYSTEMS, CHECK THAT ALL CONTROLS ARE SET TO CORRESPOND WITH THE ACTUAL POSITION OF THE SERVICES THEY OPERATE.

MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

A. Equipment and Materials

DESCRIPTION	PART NO.
Ground Power Unit - Hydraulic - Power and Preliminary Testing	EMH398E
Hydraulic Tank Pressurizing Equipment (Air Bottle with Pressure Reducing Valve)	
Access Platforms - 5 ft. 11 in. (1.8 m)	
Electrical Ground Power Unit	

B. Prepare

(1) Take the precautions described in the previous WARNING paragraph.

(2) Position access platforms.

(3) Open access door 151DB under fuselage and depressurize Green system by actuating control lever of associated pressure relief and manual unloading valve (3142).

(4) Open engine panel 415AB (Ref. 71-00-00, Servicing).

(5) Open access door 153BB, and make certain that fluid level in Green tank is normal.

(6) Pressurize hydraulic tanks (Ref. 29-13-00, Servicing).

(7) Connect electrical ground power unit (Ref. 24-41-00, Servicing).

(8) Make certain that the following circuit breakers are set :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
ENG1 SHUT-OFF VALVE CONT	2-213	W 3	F15
SHUT-OFF VALVES IND	15-216	W 5	C18

C. Pressurization (Ref. Fig. 301)

(1) Energize the aircraft electrical network (Ref. 24-41-00, Servicing).

(2) On Flight Engineer's HYDRAULIC MANAGEMENT panel, make certain that SHUT-OFF VALVES-1-GREEN magnetic indicator displays OPEN.

(3) In zone 415, unscrew and remove blanking plugs on ground connectors, and connect hydraulic ground power unit lines.

(4) Start up hydraulic ground power unit, and increase system pressure.

(5) Proceed with tests requiring hydraulic pressure.

D. Procedure for Stopping Pressurization

(1) Shut down hydraulic ground power unit.

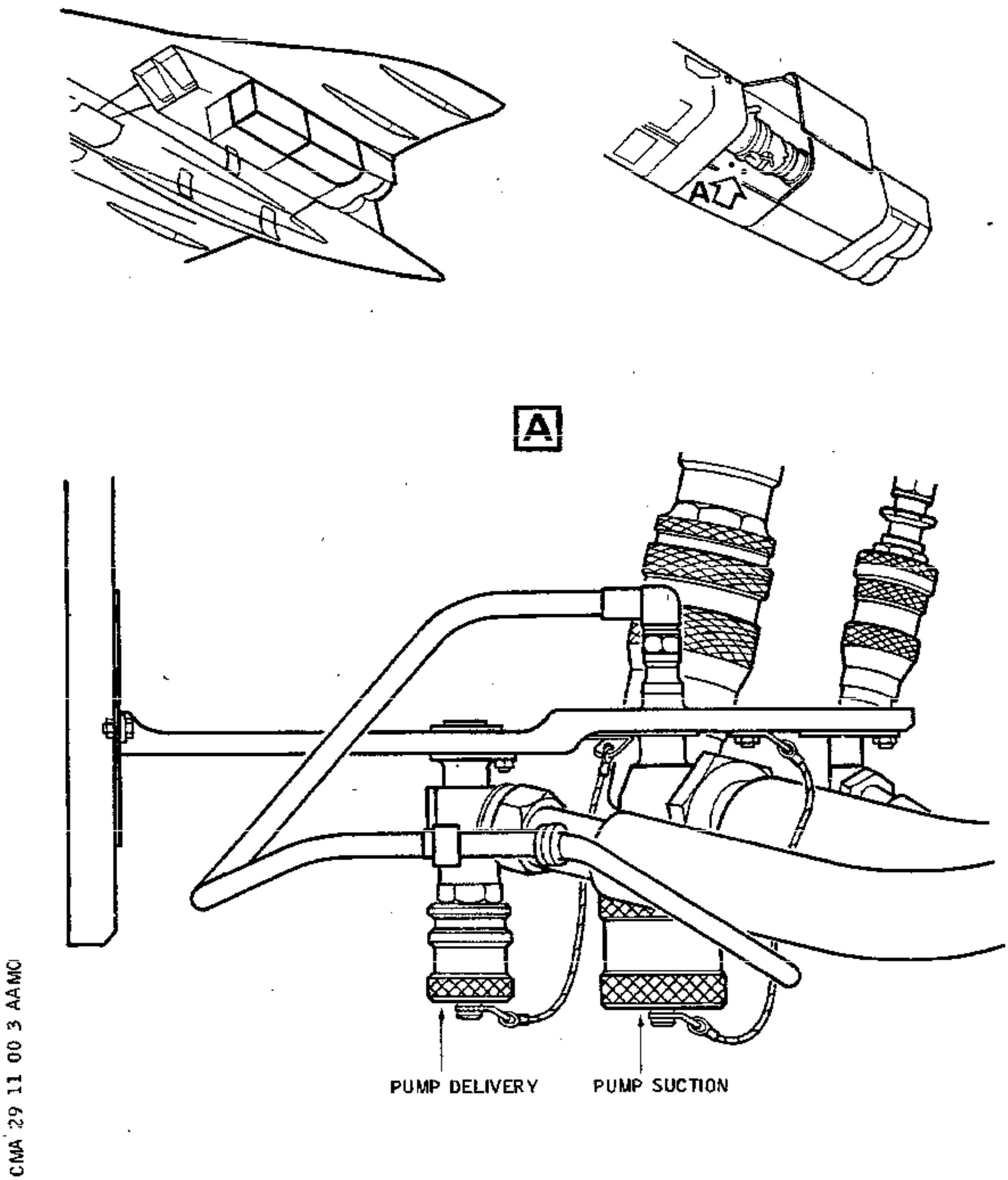
(2) At zone 151, depressurize Green system.

(3) Disconnect hydraulic ground power unit.

(4) Install blanking caps on ground connectors.

E. Close-Up

(1) Close engine panels 415AB (Ref. 71-00-00, Servicing)



Location of Green System Ground Connectors
Figure 301

and access doors 151DB and 153BB.

(2) De-energize the aircraft electrical network and disconnect electrical ground power unit.

(3) Remove hydraulic ground power unit.

(4) Remove access platforms.

Printed in England

4. Green System Pressurization Using Ground Pressurizing System (Electric Pump)

WARNING : MAKE CERTAIN THAT THE POSITIONS OF NOSE AND MAIN GEAR DOORS CORRESPOND WITH THE ACTUAL POSITIONS OF THE RESPECTIVE OPERATING HANDLES.
HANDLE LOCKED, INDICATOR PLATE SHOWING WHITE : DOORS CLOSED.
HANDLE LOCKED, INDICATOR PLATE SHOWING RED : DOORS OPEN.

MAKE CERTAIN THAT THE LANDING GEAR POSITION INDICATED ON THE GEARS POSITION INDICATING UNIT CORRESPONDS WITH THE ACTUAL POSITION OF THE LANDING GEAR.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE MAKE CERTAIN THAT THE TRAVEL RANGES OF THE CONTROL SURFACES ARE CLEAR.

BEFORE PRESSURIZING HYDRAULIC SYSTEMS, CHECK THAT ALL CONTROLS ARE SET TO CORRESPOND WITH THE ACTUAL POSITION OF THE SERVICES THEY OPERATE.

MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

A. Equipment and Materials

DESCRIPTION	PART NO.
Electrical Ground Power Unit	
Access Platform - 9 ft. 8 in. (2.96 m)	

B. Prepare

(1) Take the precautions described in the previous WARNING paragraph.

(2) Open access door 153BB under fuselage and make certain that fluid level in Green tank is normal.

(3) Make certain that the following circuit breakers are set :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
HYD GRND CHECK OUT PUMP CONT	14-216	M 656	A16
HYD GRND CHECK OUT SEL VALVE CONT	15-216	M 626	F22

(4) Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing).

C. Pressurization

(1) Pressurize hydraulic tanks (Ref. 29-13-00, Servicing).

(2) Pressurize Green system as follows :

- On Flight Engineer's GROUND HYD CHECK OUT panel.

(a) Place selector switch in GREEN BLUE position.

(b) Place PUMP 1 G-Y switch in ON position.

(3) The Green system pressure displayed on Flight Engineer's HYDRAULIC MANAGEMENT panel must rise, and stabilize at between 3408 and 3553 psi (235 bars and 245 bars).

(4) Proceed with tests requiring Green system hydraulic pressure.

D. Procedure for Stopping Pressurization

(1) On Flight Engineer's GROUND HYD CHECK OUT panel :

(a) Place PUMP 1 G-Y switch in OFF position.

(b) Place selector switch in YELLOW-YELLOW position.

E. Close-Up

(1) De-energize the aircraft electrical network and disconnect electrical ground power unit.

(2) Close access doors.

(3) Remove access platform.

5. Green System Depressurization

WARNING : BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE ; MAKE CERTAIN THAT THE TRAVEL RANGES OF THE CONTROL SURFACES ARE CLEAR.

MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

A. General

The hydraulic systems can be depressurized on the ground by means of the pressure relief and manual unloading valves, located in zone 151, near access door 151DB.

B. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform, 2.960 m (9 ft. 8 in.)	

C. Prepare

(1) Open access door 151DB under fuselage.

D. Depressurization (Ref. Fig. 302)

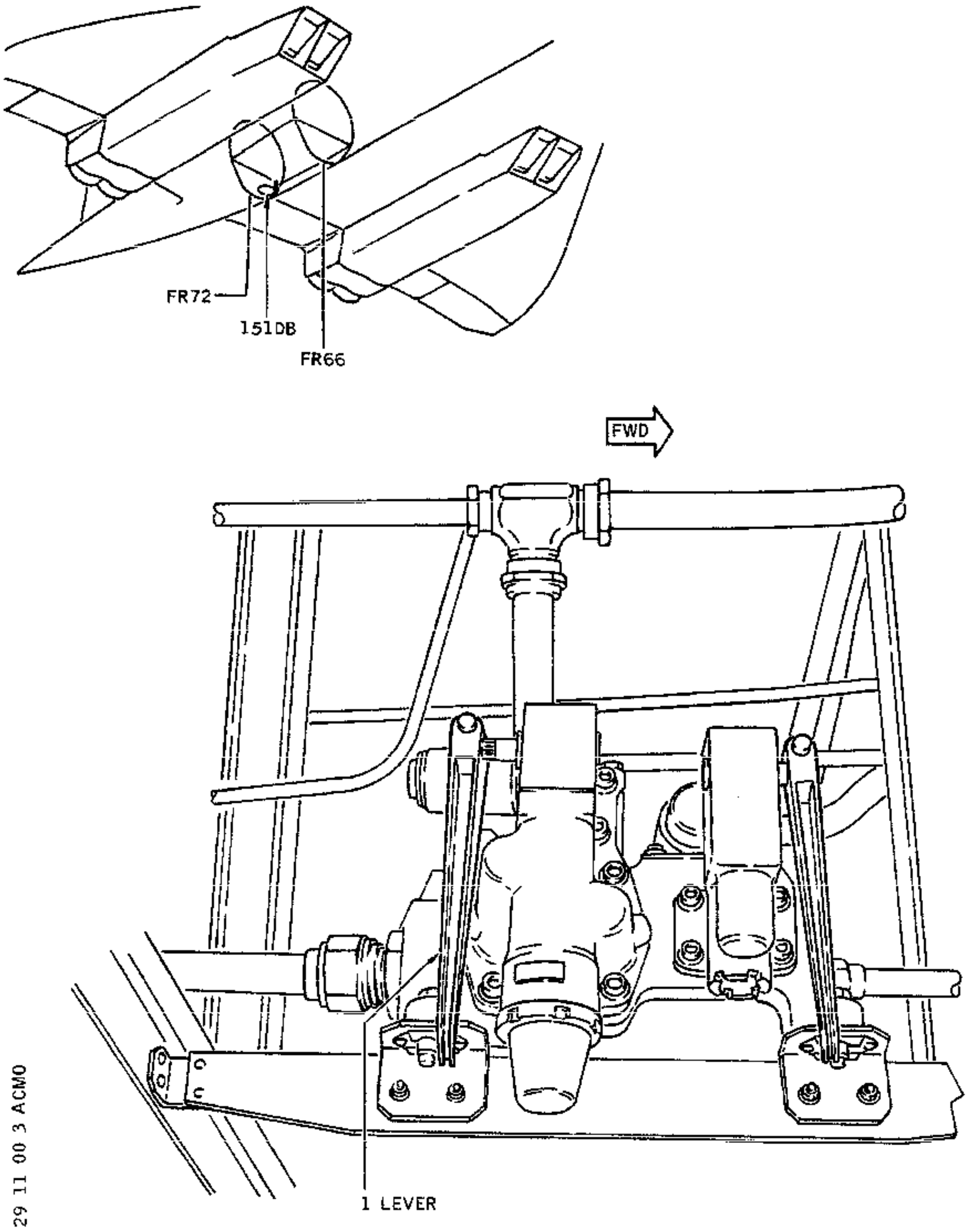
(1) Pull lever (1) on pressure relief and manual unloading valve (3142).

(2) Check on pressure gauge of Green system accumulator (3136), that system pressure drops.
Accumulator (3136) is located in the same zone as the pressure relief and manual unloading valves.

(3) When system pressure is nil, return lever (1) to its original position.

E. Close-Up

(1) Close access door and remove access platform.



CMA 29 11 00 3 ACM0

Pressure Relief and Manual Unloading Valve
Figure 302

GREEN SYSTEM - ADJUSTMENT/TEST

1. General

The two engine-driven Green hydraulic system pumps are normally pressurized when the solenoid controlling their depressurization is not energized.

2. Operational Test

Check for correct operation of pump depressurization system.

A. Equipment and Materials

DESCRIPTION	PART NO.
Electrical Ground Power Unit	
Ground Service Interphone	

B. Prepare

(1) Trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
ENG 1 GRN PUMP CONT IND	15-215	M 271	D 6
ENG 2 GRN PUMP CONT IND		M 272	D 7

(2) Check that GREEN switches 1 and 2 on Flight Engineer's HYDRAULIC MANAGEMENT panel are in ON position.

(3) Make certain that the following circuit breakers are set :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
M.W.S. SUP 1	1-213	W 252	N21
AUDIO WARNING SYS SUP 1		W 371	M21
M.W.S. SUP 2	5-213	W 251	D15
AUDIO WARN SYS SUP 2		W 372	C17

R (4) Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing).

- HYD warning light on master warning panel must come on.
- The single-stroke gong sounds.

R

C. Tests

(1) On panel 15-215, reset circuit breaker (M 271)

- L/PRESS 1 - GREEN caption light on Flight Engineer's HYDRAULIC MANAGEMENT panel must come on.

R

(2) On Flight Engineer's HYDRAULIC MANAGEMENT panel, press L/PRESS 1-GREEN caption light

- Caption light must remain illuminated.

R

- PUMPS 1-GREEN magnetic indicator must display OFF.
- In zone 415, the depressurization solenoid (energized) must operate (aural confirmation). The pump is depressurized (deactivated).

(3) On Flight Engineer's panel, release L/PRESS 1-GREEN caption light

- Caption light must remain illuminated.
- PUMPS 1-GREEN magnetic indicator must display ON.
- In zone 415 the depressurization solenoid is no longer energized. The pump becomes pressurized (active).

R (4) On panel 15-215, reset circuit breaker (M 272).

- L/PRESS 2-GREEN caption light on Flight Engineer's HYDRAULIC MANAGEMENT panel must come on.

R

R (5) On Flight Engineer's HYDRAULIC MANAGEMENT panel press L/PRESS 2-GREEN caption light

- Caption light must remain illuminated.

R

- PUMPS 2-GREEN magnetic indicator must display OFF.
- In zone 426 the depressurization solenoid (energized) must operate (aural confirmation), and the pump is depressurized (de-activated).

R (6) On Flight Engineer's panel, release L/PRESS 2-GREEN caption light.

Printed in England

- Caption light must remain illuminated.
- PUMPS 2-GREEN magnetic indicator must display ON.
- In zone 426 the depressurization solenoid is no longer energized.

R (7) On Flight Engineer's HYDRAULIC MANAGEMENT panel, place GREEN switch 1 in OFF position.

- L/PRESS 1-GREEN caption light must come on.
- PUMPS 1-GREEN magnetic indicator must display OFF.
- In zone 415, the depressurization solenoid (energized) must operate (aural confirmation). The pump is depressurized (deactivated).

R (8) On Flight Engineer's panel, return GREEN switch 1 to ON position.

- PUMPS 1-GREEN magnetic indicator must display ON.
- L/PRESS 1-GREEN caption light must remain illuminated
- In zone 415, the depressurization solenoid is no longer energized.

R (9) On Flight Engineer's HYDRAULIC MANAGEMENT panel, place GREEN switch 2 in OFF position.

- L/PRESS 2-GREEN caption light must be illuminated.
- PUMPS 2-GREEN magnetic indicator must display OFF.
- In zone 426, the depressurization solenoid (energized) must operate (aural confirmation). The pump is depressurized (deactivated).

R (10) On Flight Engineer's panel, return GREEN switch 2 to ON position.

- PUMPS 2-GREEN magnetic indicator must display ON.
- L/PRESS 2-GREEN caption light must remain illuminated.
- In zone 426, the depressurization solenoid is no longer energized.

D. Close-Up

R De-energize the aircraft electrical network and disconnect
R electrical ground power unit (Ref. 24-41-00, Servicing).

Printed in England

HYDRAULIC FLUID/FUEL SINGLE HEAT EXCHANGER - REMOVAL/INSTALLATION

WARNING: MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE, MAKE CERTAIN THAT THE TRAVEL RANGES OF THE ELEVONS ARE CLEAR.

1. General

Removal/Installation for replacement.

2. Hydraulic Fluid/Fuel Single Heat Exchanger

A. Equipment and Materials

DESCRIPTION	PART NO.
Electrical ground power unit	-
Drainage equipment - hydraulic fluid, by suction line self-sealing coupling	E921595000
Blanking plugs/caps for hydraulic fluid and fuel lines	-
Wing protective mats	-
Access platform 13 ft 7 in (4.06 metres)	-
Container for recovery of hydraulic fluid: capacity 15 litres (3.70 U.S. Gal 3.30 Imp Gal)	-
Container for recovery of fuel	-
Hydraulic fluid (Ref. 20-30-00, No.011)	-
Corrosion resistant steel lockwire, condition A, dia. 0.020 in (0.5 mm)	-
Circuit breaker safety clips	-
Corrosion resistant steel lockwire dia. 0.032 in (0.8 mm)	-

B. Prepare

(1) Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing).

R (2) Place protective mats on the wing upper surface.

R (3) Open access doors 532 CT and 532 AT.

R (4) On Flight Engineer's HYDRAULIC MANAGEMENT panel, make certain that SHUT OFF VALVES - GREEN magnetic indicators display OPEN.

R (5) On FUEL MANAGEMENT panel make certain by means of LP VALVE magnetic indicator that fuel shut-off valve of associated engine is closed.

R (6) De-energize aircraft electrical network (Ref. 24-41-00, Servicing).

R (7) Trip, safety and tag the following circuit breakers:

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
ENG1 SHUT-OFF VALVES CONT	2-213	W 3	F14
SHUT-OFF VALVES IND	15-216	1Q 1	C 1
LP VALVE SUP 1		W 5	C18

R (8) Open panel 415 AB on engine 1 (Ref. 71-00-00, Servicing).

R (9) Remove drain plug under engine fuel feed filter and drain fuel into container provided.

R (10) Unscrew bleed plug on recirculation valve.

R (11) Open access door 153 BB under fuselage, and depressurize Green system tank by opening associated depressurization valve.

R (12) Open access door 151 DB under fuselage and depressurize Green system by actuating control lever of associated pressure relief and manual unloading valve.

R (13) Remove blanking plug and open bleed valve on hydraulic shut-off valve.

R (14) Disconnect Green pump suction line at self-sealing coupling.

PRINTED IN ENGLAND

R (15) Connect hydraulic fluid drainage equipment and drain pump suction line into container provided.

R (16) Close bleed valve on hydraulic shut-off valve.

C. Remove

(1) Remove air/fuel heat exchanger fuel supply line:

(a) Cut and remove lockwire and remove screws (7) attaching adapter (5). Remove bonding strip.

(b) Remove flange attachment screws at other end of line.

(c) Remove line.

(2) Remove fuel Y-line:

(a) Fold back safety tabs and remove attaching screws (13).

(b) Remove bonding strip.

(c) Unscrew engine feed line coupling nut.

(d) Unscrew air/fuel heat exchanger return line coupling nut.

(e) Remove Y-line.

(3) Remove air/fuel heat exchanger fuel return line:

(a) Disconnect bonding strip.

(b) Unscrew coupling nut.

(c) Remove line.

(4) Disconnect heat exchanger outlet hydraulic line:

(a) Remove from brackets clamps supporting line (15).

(b) Unscrew coupling nut (16).

(5) Disconnect heat exchanger inlet hydraulic line:

(a) Remove from brackets clamps supporting line (12).

(b) Unscrew coupling nut (11).

(6) Cut and remove lockwire and remove attachment screws (1), remove and retain washers (2).

PRINTED IN ENGLAND

(7) Remove heat exchanger:

R (a) Disconnect bonding strip from bonding plate (20).

R (b) Remove attaching screws (3) and (9), washers (4) and
R (10) and bonding plate (20).

R (c) Remove split pin (17), bolt (19) and washer (18).

R (d) Remove heat exchanger (8) from its mounting.

R (e) Cap all open line ends.

D. Preparation of Replacement Component

E. Install

NOTE: The seals must be lubricated with Product No.011 (Ref. 20-30-00).

(1) Install heat exchanger:

(a) Remove caps from fuel inlet (BY-PASS) line.

(b) Position heat exchanger (8) on its mounting and push home.

R (c) Install attaching screws (3) and (9), washers (4) and
R (10) and bonding plate (20).

R (d) Connect bonding strip to bonding plate (20).

R (e) Insert bolt (19), install washer (18) and safety with split pin (17).

R (f) Tighten attaching screws (3) and (9).

R (g) Install screws (1) with washers (2) and bonding strip.

R (h) Wirelock screw (1) through access door 532 AT not forgetting to attach bonding strip.

(2) Connect heat exchanger inlet hydraulic line (12):

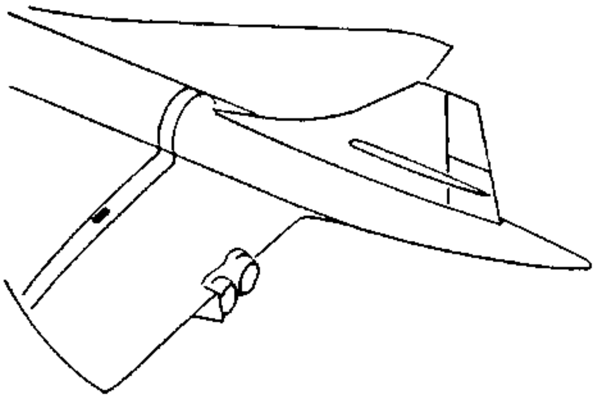
(a) Remove blanking cap, replace line (12) seals and fit line into heat exchanger.

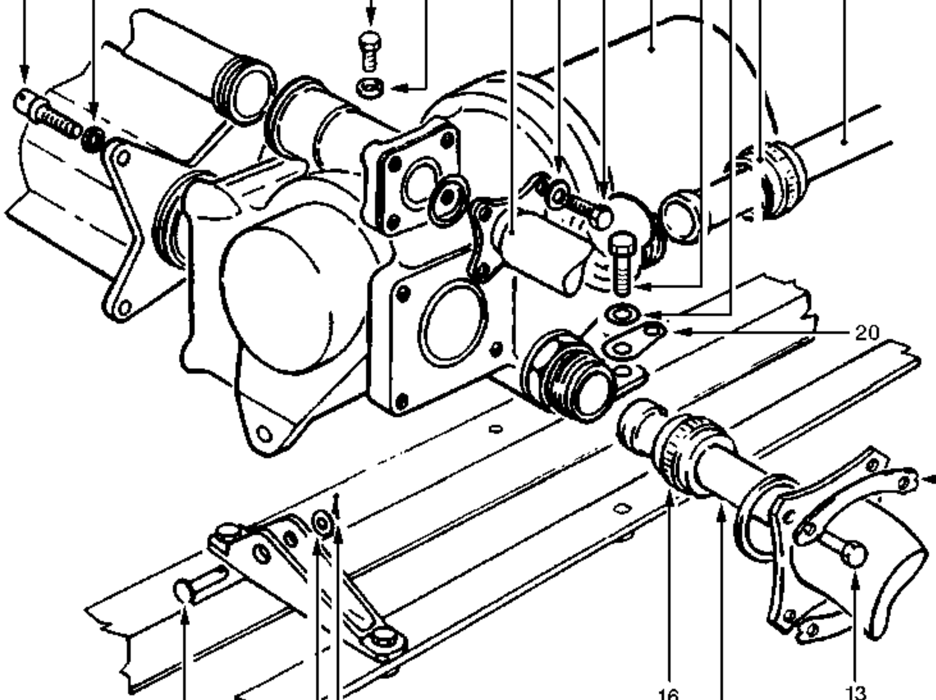
(b) Tighten coupling nut (11).

(c) Secure line (12) support clamps to their brackets.

PRINTED IN ENGLAND

PRINTED IN ENGLAND





R Single Heat Exchanger
R Figure 401

(3) Connect heat exchanger outlet hydraulic line (15):

(a) Remove blanking cap, replace line (15) seals and fit line into heat exchanger.

(b) Tighten coupling nut (16).

(c) Secure line (15) support clamps to their brackets.

(4) Install air/fuel heat exchanger fuel return line:

(a) Remove blanking caps and replace seals.

(b) Tighten coupling nut on air/fuel heat exchanger side.

(c) Attach bonding strip.

(5) Install fuel Y-line:

(a) Replace seals and position Y-line on heat exchanger.

(b) Install locking plate (14) and attaching screws (13).

(c) Tighten screws (13) and fold over tabs of locking plate (14).

(d) Tighten coupling nut on engine feed side.

(e) Attach bonding strip.

(f) Tighten coupling nut on air/fuel heat exchanger return line.

(6) Install air/fuel heat exchanger supply line:

(a) Install adapter (5) on line.

(b) Position line.

(c) Attach adapter to heat exchanger with screws (7) and washers (6). Do not omit bonding strip.

(d) Tighten screws and wirelock.

(e) Install attaching screws on the opposite side.

(f) Attach bonding strip.

PRINTED IN ENGLAND

(7) Remove hydraulic fluid drainage equipment.

(8) Connect hydraulic pump suction line.

(9) Close and wirelock fuel drain plug.

(10) Close and wirelock fuel air vent plug.

(11) Close tank depressurization valve and secure with a safety pin.

(12) Bleed pump suction line (Ref. 29-11-00, Servicing).

(13) Wet torque shut-off valve bleed valve with product No.011 (Ref. 20-30-00) to between 0.40 and 0.55 mdaN (35 and 49 lbf in).
Wirelock.

(14) Cap bleed valve and wirelock cap.

(15) Replenish hydraulic tank as required (Ref. 12-12-29).

F. Test

(1) Check for absence of external leakage on the installation during the next test run-up.

G. Close-Up

(1) Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(2) Clean heat exchanger and adjacent area. Make certain that no trace of hydraulic fluid remains.

(3) Remove safety clips and tags and reset circuit breakers tripped in para. B.(6).

(4) Close engine panel.

(5) Disconnect and remove electrical ground power unit (Ref. 24-41-00, Servicing).

(6) Close access doors.

(7) Remove wing protective mat.

(8) Remove access platform.

PRINTED IN ENGLAND

HYDRAULIC SHUT-OFF VALVE - REMOVAL/INSTALLATION

WARNING : MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE, MAKE CERTAIN THAT THE TRAVEL RANGES OF THE ELEVONS ARE CLEAR.

1. General

A. Removal for Replacement

The removal/installation procedure described in this topic
R applies to both shut-off valves in the Green system.

2. Hydraulic Shut-off Valves

A. Equipment and Materials

DESCRIPTION	PART NO.
Wing Protective Mats	
Blanking Plugs/Caps	
Access Platform - 13 ft. 7 in. (4.06 metres)	
Container : Capacity 15 l (3.70 US Gal, 3.30 Imp. Gal.)	
Hydraulic Tank Pressurizing Equipment (Air bottle with Pressure Reducing Valve)	
Hydraulic Fluid (Ref. 20-30-00, No.011)	
R Corrosion Resistant Steel Lockwire, Dia. 0.41 in. (1mm), Condition A	
Drainage Equipment - Hydraulic Fluid, by Suction Line Self-Sealing Coupling	D921595000

B. Prepare

(1) Open access door 532CT or 531BT on LH wing.

(2) Open access door 153AB under fuselage, and depressurize R Green system tank by opening associated depressurization valve.

(3) Open access door 151DB under fuselage and depressurize Green system by actuating control lever of associated pressure relief and manual unloading valve.

(4) Trip, safety and tag the following circuit breakers :

(a) For engine 1 shut-off valve :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
ENG1 SHUT-OFF VALVES CONT	2-213	W 3	F15
HYD GRND CHECK OUT SEL VALVE CONT	15-216	M 626	F22
SHUT-OFF VALVES IND		W 5	C18

(b) For engine 2 shut-off valve :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
ENG2 SHUT-OFF VALVES CONT	2-213	W 7	B15
HYD GRND CHECK OUT SEL VALVE CONT	15-216	M 626	F22
SHUT-OFF VALVES IND		W 5	C18

(5) Remove blanking plug (4) and open bleed valve (5) on shut off valve to be removed.

(6) Open access panels 415AB or 425AB on engine 1 or 2 (Ref. 71-00-00, Servicing). Disconnect hydraulic pump suction line at self-sealing coupling.

(7) Install drainage equipment and allow hydraulic fluid to flow into container provided.

(8) Connect tank pressurizing equipment to ground connector 0191, zone 153.

C. Remove

(1) Disconnect electrical connector (6).

(2) Disconnect hydraulic suction line (1).

(3) Cut and remove lockwire and remove bolts (3) and (8); remove bonding strip.

(4) Remove shut-off valve.

(5) Cap open line ends.

D. Preparation of Replacement Component

E. Install

(1) Remove blanking caps.

(2) Replace shut-off valve seal (7) (lubricate seal with product No.011).

(3) Position shut-off valve.

CAUTION : DO NOT DAMAGE THE SEAL.

(4) Secure shut-off valve with bolts (3) and (8) without tightening. Do not omit washers (2) and bonding strip.

(5) Connect hydraulic suction line (1).

(6) Fully tighten and dry torque bolts (3) and (8), to
R between 0.80 and 0.95 m.daN (70.776 lbf.in. and
R 84.046 lbf.in.). Wirelock.

(7) Tighten hydraulic suction line (1).

(8) Connect electrical connector (6).

(9) Disconnect drainage equipment.

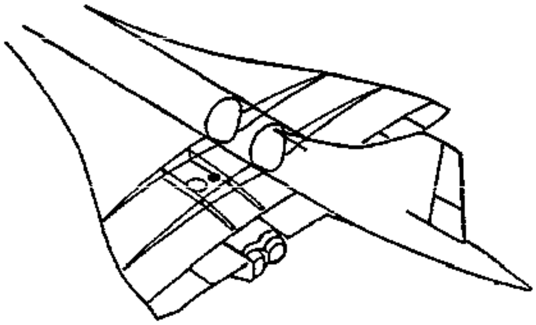
(10) Connect pump suction line to self-sealing coupling.

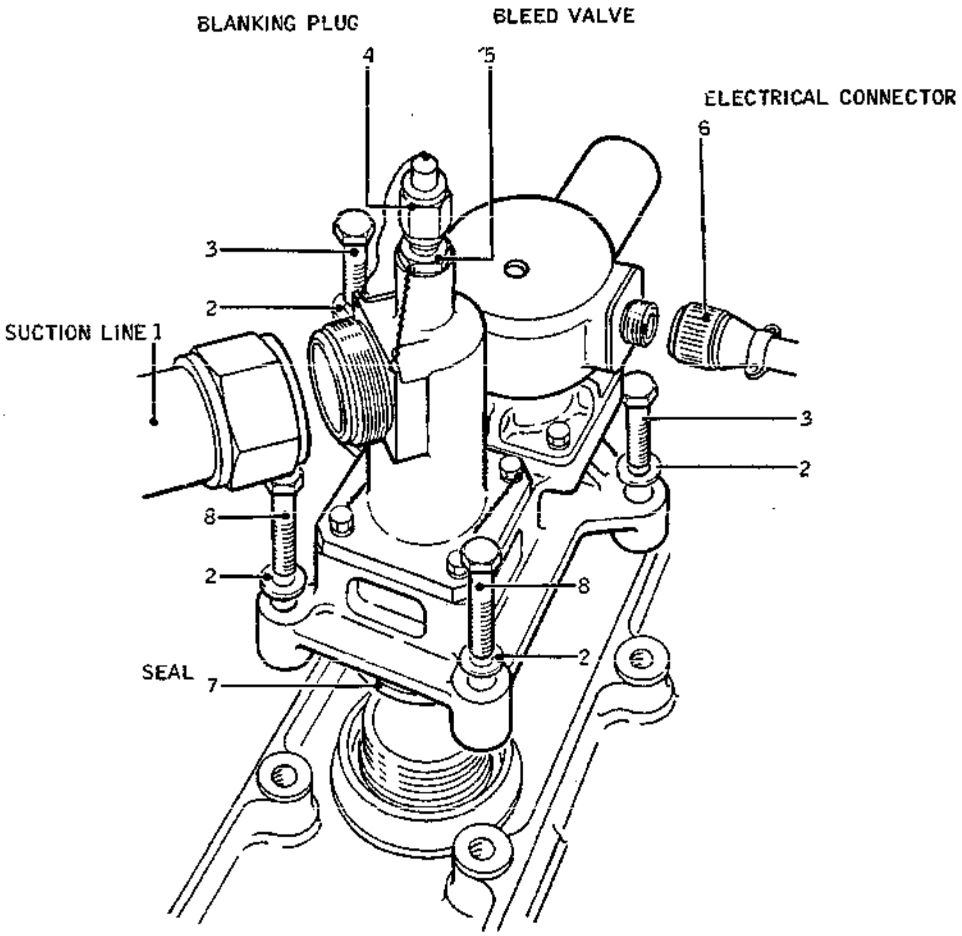
(11) Remove safety clips and tags and reset circuit breakers.

R (12) Close tank depressurization valve and secure with a safety pin.

R (13) Bleed pump suction line (Ref. 29-11-00, Servicing).

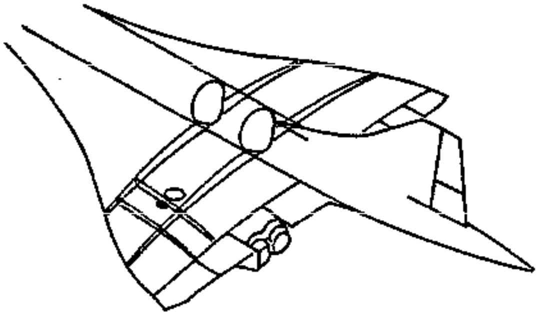
R (14) Fully tighten and wet torque shut-off valve bleed valve
R (5) with product No.011 to between 0.40 and 0.55 m.daN

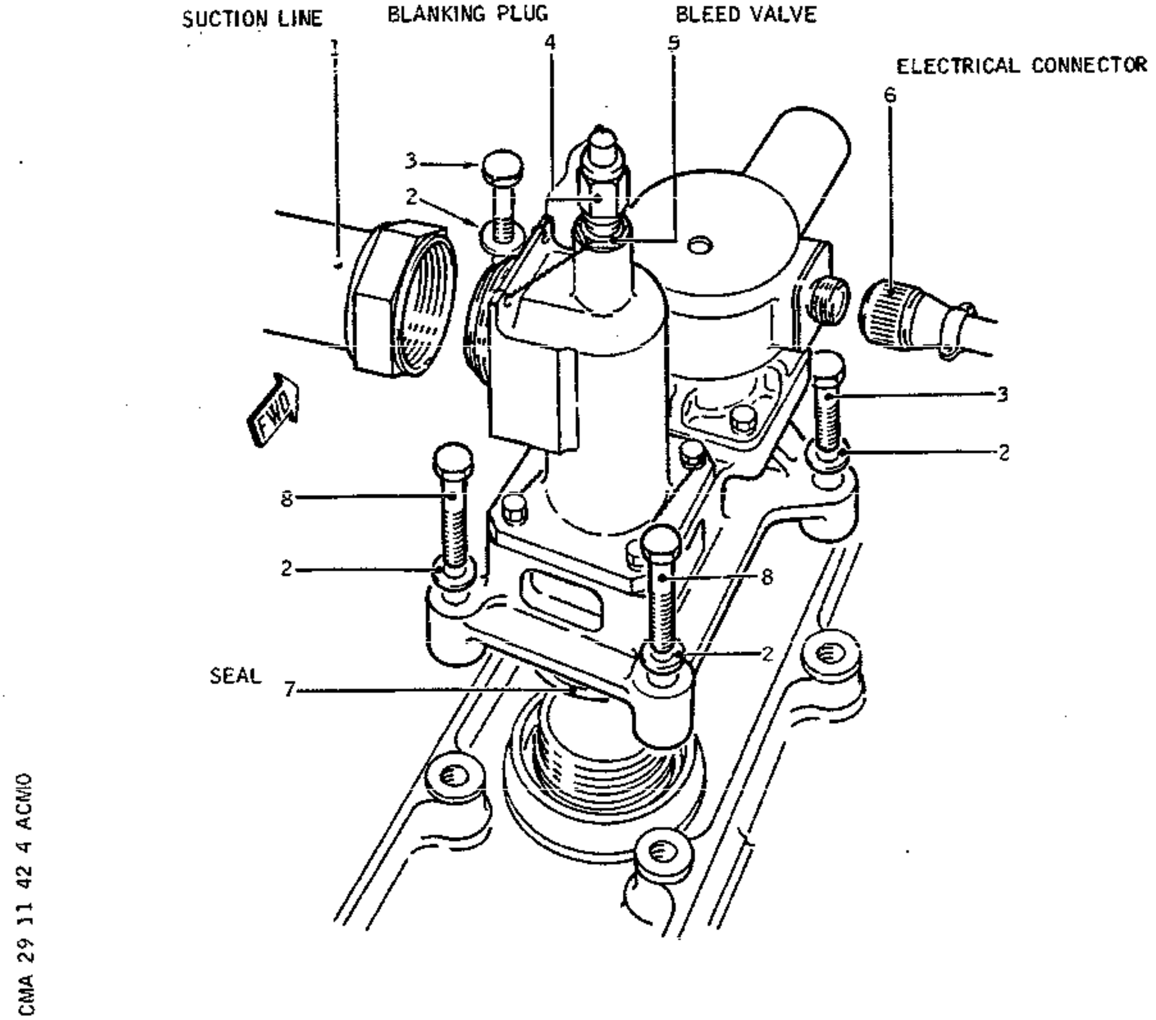




CMA 29 11 42 4 AAM0

Engine 2 Shut-Off Valve
Figure 401





Engine 1 Shut-Off Valve
Figure 402

R (35 and 49 lbf.in.). Wirelock.

R (15) Position blanking cap (4) on bleed valve and wirelock.

R (16) Replenish hydraulic tank as required (Ref. 12-12-29).

(17) Clean shut-off valve and adjacent area. Make certain that no trace of hydraulic fluid remains.

F. Tests

R (1) Pressurize hydraulic tanks to 70 psi (4.8 bars) and check for external leakage on shut-off valve.

R (2) Test shut-off valve (Ref. 29-11-42, Adjustment/Test).

G. Close-Up

R (1) Disconnect and remove tank pressurizing equipment.

(2) Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(3) Close access doors.

R (4) Close engine panel (Ref. 71-00-00, Servicing).

(5) Remove wing protective mat.

(6) Remove wing access platform.

R HYDRAULIC SHUT-OFF VALVE - ADJUSTMENT/TEST

1. General

R The shut-off valves, which are mounted on the hydraulic pump suction line, enable the supply of hydraulic fluid to be cut off in the event of engine fire.

CAUTION : THE HYDRAULIC SYSTEMS MUST NOT, UNDER ANY CIRCUMSTANCES, BE PRESSURIZED BY A HYDRAULIC GROUND POWER UNIT DURING THESE TESTS.

2. Operational Test

R Check for correct operation of the shut-off valves.

A. Equipment and Materials

DESCRIPTION	PART NO.
Electrical Ground Power Unit	

B. Prepare

(1) Make certain that the following circuit breakers are set :

R Engine 1 Green system shut-off valve

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
ENG1 SHUT OFF VALVES CONT	2-213	W 03	F15
SHUT OFF VALVES IND	15-216	W 05	C18

R Engine 2 Green system shut-off valve

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
ENG2 SHUT OFF VALVES CONT	2-213	W 07	B15
SHUT OFF VALVES IND	15-216	W 05	C18

R R (2) Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing).

C. Test

(1) On Flight Engineer's HYDRAULIC MANAGEMENT panel, place GREEN switches 1 and 2 in SHUT position. SHUT-OFF-VALVES-GREEN 1 and 2 magnetic indicators must display stripes throughout transit of the valves, and then SHUT.

(2) On Flight Engineer's HYDRAULIC MANAGEMENT panel, place GREEN switches 1 and 2 in ON position. SHUT-OFF-VALVES-GREEN 1 and 2 magnetic indicators must display stripes throughout transit of the valves and then OPEN.

D. Close-Up

R R De-energize the aircraft electrical network and disconnect electrical ground power unit (Ref. 21-41-00, Servicing).

3. Functional Test

R Check for correct operating condition of shut-off valves.

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform - 13 ft. 7 in. (4.06 metres)	
Electrical Ground Power Unit	
Wing Protective Mats	

B. Prepare

(1) Make certain that the following circuit breakers are set :

R Engine 1 Green system shut-off valve

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
ENG1 SHUT OFF VALVES CONT	2-213	W 03	F15
SHUT OFF VALVES IND	15-216	W 05	C18

R Engine 2 Green system shut-off valve

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
ENG2 SHUT OFF VALVES CONT	2-213	W 07	B15
SHUT OFF VALVES IND	15-216	W 05	C18

(2) Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing).

(3) On ENGINE FIRE CONTROLS overhead panel, make certain that fire control handles are in normal position (pushed in).

(4) Open access doors 531BT and 532CT.

C. Test

(1) On Flight Engineer's HYDRAULIC MANAGEMENT panel, place GREEN switches 1 and 2 in SHUT position. SHUT-OFF-VALVES-GREEN 1 and 2 magnetic indicators must display stripes throughout transit of the valves, and then SHUT when the valves close.

R In zones 531 and 532, the shut-off valves must close and this condition must be indicated by their mechanical indicators. R

(2) On Flight Engineer's HYDRAULIC MANAGEMENT panel, place GREEN switches 1 and 2 in OFF position. SHUT-OFF-VALVES GREEN 1 and 2 magnetic indicators must display stripes throughout transit of the valves and then R OPEN when valves open. In zones 531 and 532, the shut-off valves must open and this condition must be indi- R cated by their mechanical indicators.

(3) On Flight Engineer's HYDRAULIC MANAGEMENT panel, place GREEN switches 1 and 2 in ON position. No change. The results are the same as in (2) above.

(4) On ENGINE FIRE CONTROLS overhead panel, pull out engines 1 and 2 ENGINE FIRE control handles.
On Flight Engineer's HYDRAULIC MANAGEMENT panel, SHUT-OFF-VALVES-GREEN 1 and 2 magnetic indicators must display stripes throughout transit of the valves, and then SHUT when the valves close.
R In zones 531 and 532, the shut-off valves must close and this condition must be indicated by their mecha- R nical indicators.

(5) On ENGINE FIRE CONTROLS overhead panel, push in engines 1 and 2 ENGINE FIRE control handles.
On Flight Engineer's HYDRAULIC MANAGEMENT panel, SHUT-OFF-VALVES-GREEN 1 and 2 magnetic indicators must display stripes throughout transit of the valves, then OPEN when valves open.
R In zones 531 and 532 the shut-off valves must open and this condition must be indicated by their mecha- R nical indicators.

D. Close-Up

(1) Close access doors.

(2) Remove wing protective mats and access platform.

(3) De-energize the aircraft electrical network, and
R disconnect electrical ground power unit (Ref.
R 24-41-00, Servicing).

HYDRAULIC POWER ACCUMULATOR - REMOVAL/INSTALLATION

WARNING : MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE MAKE CERTAIN THAT TRAVEL RANGES OF THE ELEVONS ARE CLEAR.

1. General

The Green system accumulator is located in zone 151 and is accessible through door 151DB.

R NOTE : If the accumulator is replaced due to insufficient pre-
R load Nitrogen pressure, the Hydraulic Tank De-Aerator
R Safety Valve is to be checked for clogging indication.

2. Accumulator

A. Equipment and Materials

DESCRIPTION	PART NO.
Blanking Plugs/Caps for Hydraulic Lines	
Circuit Breaker Safety Clips	
Access Platform - 9 ft. 8 in. (2.96 meters)	
Corrosion Resistant Lockwire, Condition A, Dia. 0.032 in. (0.8 mm)	

B. Prepare

(1) Trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
HYD GRND CHECK OUT SEL VALVE CONT	15-216	M 626	F22
HYD TANK COMPR CONT	15-215	M 602	D 8

(2) Open access door 153BB under fuselage, and depressurize Green system tank by opening associated depressurization valve.

(3) Open access door 151DB under fuselage and depressurize Green system by actuating control lever of associated pressure relief and manual unloading valve.

(4) Close tank depressurization valve and secure with safety pin.

C. Remove

(1) Slowly release accumulator nitrogen pressure.

**ON A/C 001-004,

(2) Unscrew coupling nut (8) securing elbow (7), and, remove line. Unscrew coupling nut at other end of line, and remove clamp attaching line to frame. Cap open ends of lines and ports of accumulator.

After SB 29-002 For A/C 001-004,

(2) Unscrew coupling nut (8) securing elbow (7), and cap open ends of line and ports of accumulator.

(3) Remove clamps (9) and (11).

(4) Cut and remove lockwire and loosen screws (2).

(5) Support accumulator (10) and remove screws (2) from attachment bracket (1).

(6) Pivot lower support (5) about pins (3) and (4).

(7) Remove accumulator (10).

D. Preparation of Replacement Component

(1) Remove elbow (7) from removed accumulator.

(2) Replace O-ring and install elbow (7) on replacement accumulator.

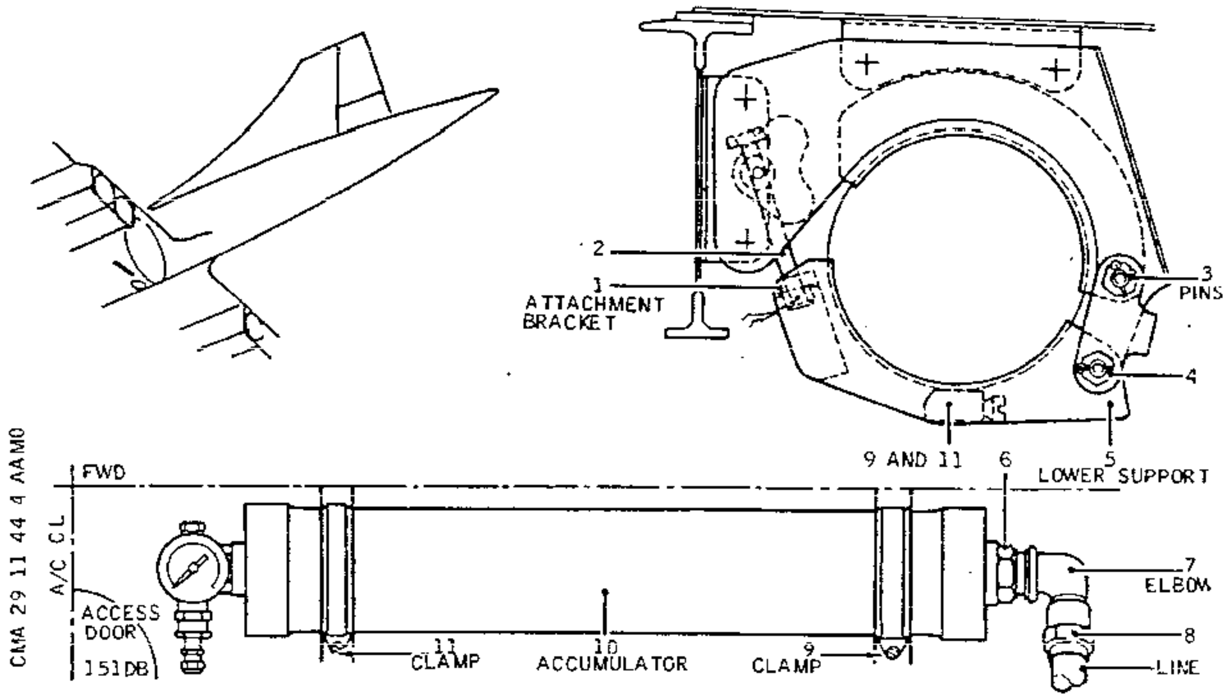
(3) Correctly position elbow (7) and tighten nut (6).

E. Install

(1) Position accumulator (10) on support fittings.

(2) Place lower supports (5) around the accumulator and insert screws (2) into attachment brackets (1).

(3) Tighten screws (2) and wirelock.



Hydraulic Power Accumulator
Figure 401

(4) Install clamps (9) and (11) and tighten.

**ON A/C 001-004,

(5) Install line :

(a) Tighten coupling nut (8) on elbow (7). Tighten coupling nut at other end of line on correspon-ding union.

(b) Install clamp to attach line to frame.

After SB 29-002 For A/C 001-004,

(5) Tighten nut (8) on elbow (7).

(6) Charge accumulator with nitrogen (Ref. 29-00-00, Servicing).

(7) Replenish tank as required (Ref. 12-12-29).

RB (8) Inspect p-clip for evidence of damage and check for
RB secure attachment to hydraulic pipe.

F. Test

When pressurizing the system check the installation for leakage.

G. Close-Up

(1) Make certain that working area is clear of tools and miscellaneous items of equipment.

(2) Clean the accumulator and adjacent area and make certain that no trace of hydraulic fluid remains.

(3) Close access doors.

(4) Remove access platform.

(5) Remove safety clips and tags and reset the circuit breakers.

PRINTED IN ENGLAND

WARNING : MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE, MAKE CERTAIN THAT THE TRAVEL RANGES OF THE ELEVONS ARE CLEAR.

1. General

The double heat exchanger is located in the upper part of the wing and is accessible through access door 531BT.

2. Hydraulic Fluid/Fuel Double Heat Exchanger

A. Equipment and Materials

DESCRIPTION	PART NO.
Electrical Ground Power Unit	
Drainage Equipment - Hydraulic Fluid, by Suction Line Self-Sealing Coupling	D921595000
Blanking Plugs/Caps for Hydraulic Fluid and Fuel Lines	
Wing Protective Mats	
Access Platform - 13 ft.7 in (4.06 metres)	
Container for Recovery of Hydraulic Fluid : Capacity 15 litres (3.70 U.S. Gal, 3.30 Imp Gal)	
Container for Recovery of Fuel	
Hydraulic Fluid (Ref. 20-30-00, No.011)	
Corrosion-Resistant Steel Lockwire R Condition "A", Dia. 0.020 in (0.5mm)	
Corrosion-Resistant Steel Lockwire R Condition "A", Dia. 0.032 in (0.8mm)	

R

B. Prepare

(1) Connect electrical ground power unit and energize the aircraft electrical network. (Ref. 24-41-00, Servicing)

(2) Open access doors 531BT and 531AT.

(3) On Flight Engineer's HYDRAULIC MANAGEMENT panel make certain that SHUT OFF VALVES - GREEN and YELLOW magnetic indicators display OPEN.

(4) On FUEL MANAGEMENT panel make certain by means of LP VALVE magnetic indicator (engine 2) that associated fuel shut off valve is closed.

(5) De-energize aircraft electrical network (Ref. 24-41-00, Servicing).

(6) Trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER		MAP REF.
ENG 2 SHUT OFF VALVES CONT	2-213	W	7	B15
SHUT OFF VALVES IND	15-216	W	5	C18
TANK 2 LP VALVE SUP 2	15-215	2Q	1	C19

(7) Open panel 426AB on engine 2 (Ref. 71-00-00, Servicing)

(8) Remove drain plug under engine fuel feed filter and drain fuel into container provided.

(9) Unscrew bleed plugs on recirculation valves.

(10) Open access door 153BB under fuselage and depressurize Green and Yellow system tanks by opening associated depressurization valves.

(11) Open access door 151DB under fuselage and depressurize Green and Yellow systems by actuating control lever of associated pressure relief and manual unloading valves.

(12) Remove Green and Yellow system shut-off valve blanking plugs and open bleed valves.

(13) Disconnect suction lines of Green and Yellow pumps at self-sealing couplings.

(14) Connect hydraulic fluid drainage equipment and drain pump suction lines into container provided.

(15) Close bleed valves on hydraulic shut-off valves.

C. Remove

(1) Remove air/fuel heat exchanger fuel supply line :

(a) Cut and remove lockwire and remove screws (7) attaching adaptor (5). Remove bonding strip.

(b) Remove flange attachment screws at other end of line.

(c) Remove line.

(2) Remove fuel Y-line :

(a) Straighten safety tabs and remove attaching screws (13).

(b) Remove bonding strip.

(c) Loosen engine feed line coupling nut.

(d) Loosen air/fuel heat exchanger return line coupling nut.

(e) Remove Y-line

(3) Remove air/fuel heat exchanger fuel return line :

(a) Disconnect bonding strip.

(b) Loosen coupling nut.

(c) Remove line.

(4) Disconnect heat exchanger outlet hydraulic lines :

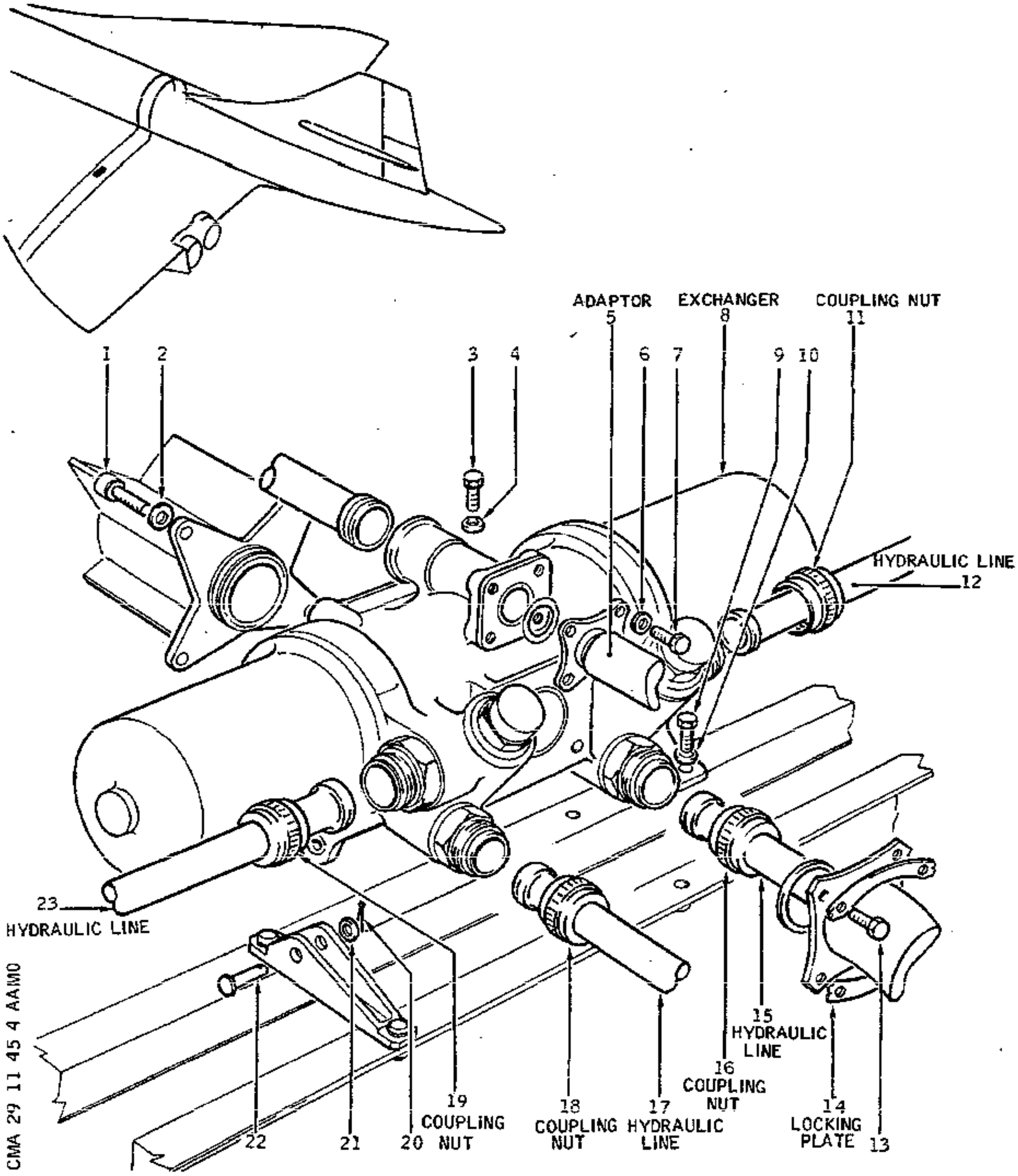
(a) Remove from their supports clamps attaching lines (15) and (17).

(b) Loosen coupling nuts (16) and (18).

(5) Disconnect heat exchanger inlet hydraulic lines :

(a) Remove from their brackets clamps attaching lines (12 and 23).

Printed in England



Double Heat Exchanger
Figure 401

(b) Loosen coupling nuts (11 and 19).

(6) Cut and remove lockwire and remove attaching screws (1). Remove and retain washers (2).

(7) Remove heat exchanger :

(a) Remove attaching screws (3) and (9).

(b) Remove split pin (20), clevis pin (22) and washer (21).

(c) Remove heat exchanger (8) from its mounting.

(d) Cap open ends of lines remaining in position.

D. Preparation of Replacement Component

E. Install

NOTE : The seals must be lubricated with Product No.011.

(1) Install heat exchanger :

(a) Remove caps from fuel inlet bypass lines.

(b) Position heat exchanger (8) on its mounting and push home.

(c) Install attaching screws (3) and (9) and washers (4) and (10).

(d) Insert clevis pin (22), install washer (21) and safety with split pin (20).

(e) Tighten attaching screws (3) and (9).

(f) Install screws (1) with washers (2). Tighten home and wirelock. Do not omit bonding strip.

(2) Connect heat exchanger inlet hydraulic lines (12) and (23) :

(a) Remove blanking caps and replace seals.

(b) Install lines (12) and (23) on heat exchanger (8) and tighten coupling nuts (11) and (19).

(c) Install attachment clamps for lines (12) and (23) on their supports.

(3) Connect heat exchanger outlet hydraulic lines (15) and (17) :

(a) Remove blanking caps and replace seals.

(b) Install lines (15) and (17) on heat exchanger (8) and tighten coupling nuts (16) and (18).

(c) Install line attachment clamps on their supports.

(4) Install air/fuel heat exchanger fuel return line :

(a) Remove blanking caps and replace seals.

(b) Tighten coupling nut on air/fuel heat exchanger side.

(c) Attach bonding strip.

(5) Install fuel Y-line :

(a) Replace seals and position Y-line on heat exchanger.

(b) Install locking plate (14) and attaching screws (13).

(c) Tighten screws (13) and fold over tabs of locking plate (14).

(d) Tighten coupling nut on engine feed side.

(e) Attach bonding strip.

(f) Tighten coupling nut on air/fuel heat exchanger return.

(6) Install air/fuel heat exchanger fuel supply line :

(a) Install adaptor (5) on line.

(b) Position line.

(c) Attach adaptor to heat exchanger with screws (7), washers (6).

(d) Tighten screws and wirelock. Do not omit bonding strip.

(e) Install attaching screws on the opposite side.

(f) Attach bonding strip.

(7) Remove hydraulic fluid drainage equipment.

(8) Connect Green and Yellow hydraulic pump suction lines.

(9) Close and wirelock fuel drain plugs.

(10) Close and wirelock fuel air vent plug.

(11) Close Yellow and Green tank depressurization valves and secure with safety pins.

(12) Bleed suction lines of pumps (Ref. 29-11-00, and 29-21-00, Servicing).

(13) Fully tighten and wet torque shut off valve bleed valves with Product No.011 to between 0.40 and 0.55 m. daN (35 and 49 lbf.in.). Wirelock.

(14) Cap bleed valve and wirelock cap.

(15) Replenish hydraulic tanks as required (Ref. 12-12-29). 12-12-29).

F. Test

Check for external leakage on the installation during the next engine run-up.

G. Close-Up

(1) Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(2) Clean heat exchanger and adjacent area and make certain that no trace of hydraulic fluid remains.

(3) Remove safety clips and tags and reset circuit breakers.

(4) Close engine panel.

(5) Disconnect and remove electrical ground power unit (Ref. 24-41-00, Servicing).

(6) Close access doors.

(7) Remove wing protective mat.

(8) Remove access platform.

SAMPLING VALVE - REMOVAL/INSTALLATION

1. General

The sampling valve is located in the upper LH part of zone 151.

2. Sampling Valve

A. Equipment and Materials

DESCRIPTION	PART NO.
Container for Recovery of Hydraulic Fluid	
Corrosion-Resistant Steel Lockwire, Dia. 0.032 in. (0.8 mm)	
Access Platform	
Blanking Plugs/Caps	

B. Prepare

(1) Open access door 151DB, and depressurize Green system (Ref. 29-11-00, Servicing).

(2) Open access door 153BB, and depressurize Green system tank (Ref. 29-13-00, Servicing).

(3) Trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
HYD GRND CHECK OUT SEL VALVE CONT	15-216	M 626	F22
HYD TANK COMPR CONT	15-215	M 602	D 8

(4) Display a warning notice on engine 1 prohibiting pressurization of Green hydraulic system.
Display a warning notice at Flight Engineer's station prohibiting use of ground pressurizing system electric pumps.
If a hydraulic ground power unit is connected to the

aircraft, display a warning notice on the unit prohibiting pressurization of the aircraft hydraulic system.

C. Remove

(1) Cut and remove lockwire.

(2) Remove sampling valve (1) from union (3).

(3) Plug/cap open ports of union and sampling valve.

D. Preparation of Replacement Component

(1) Cut and remove lockwire, remove cap (4) from sampling valve.

(2) Check that valve is closed.

(3) Install cap on valve, moderately tighten by hand, and wirelock (Ref. 20-21-13).

E. Install

(1) Remove blanking plugs/caps.

(2) Place O-ring gasket (2) on sampling valve (1).

(3) Install sampling valve (1) in union (3).
Torque to 7.9 ± 0.05 m.daN (58.26 ± 0.36 lbf.ft.).

(4) Wirelock sampling valve (1) (Ref. 20-21-13).

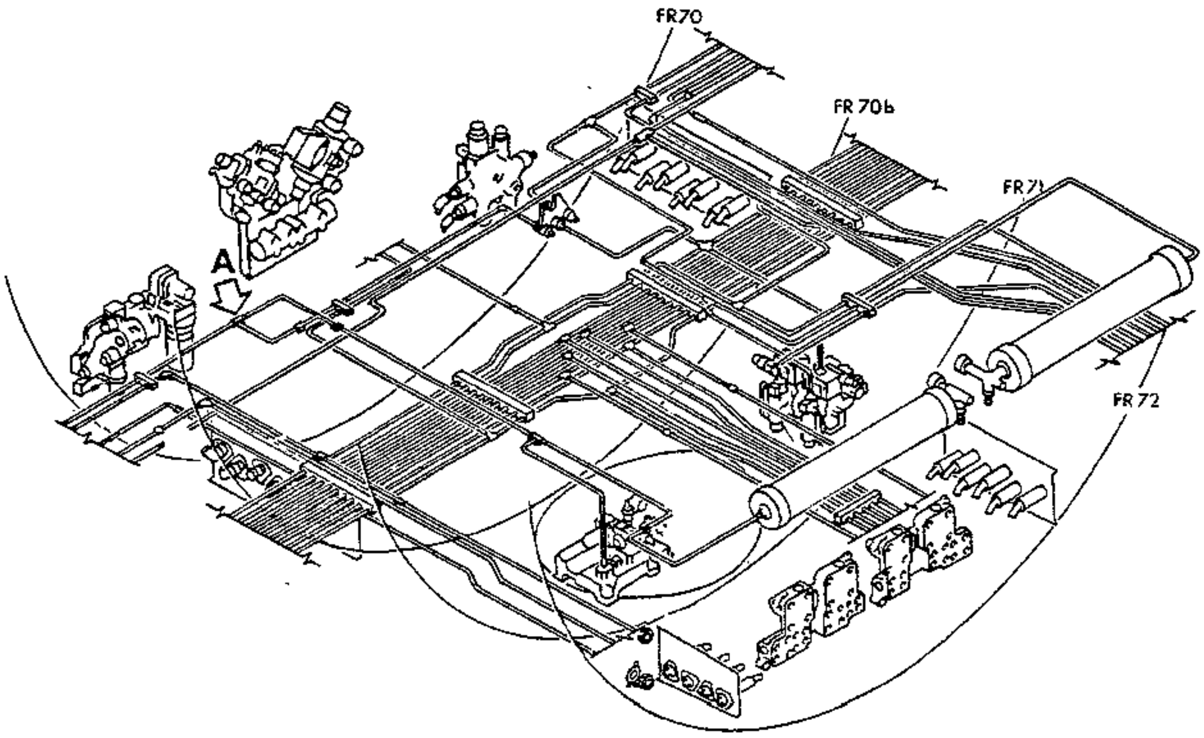
(5) Remove safety clips and tags and reset the following circuit breakers :

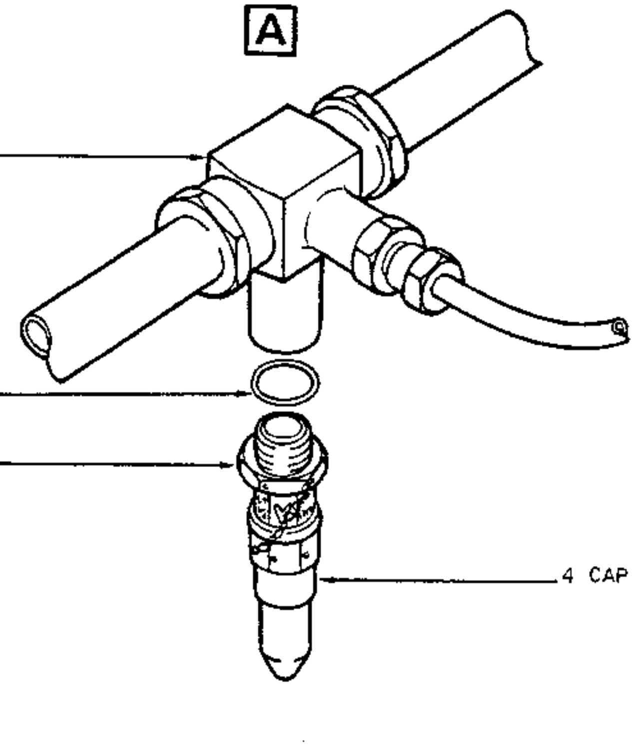
SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
HYD GRND CHECK OUT SEL VALVE CONT	15-216	M 626	F22
HYD TANK COMPR CONT	15-215	M 602	D 8

(6) Remove warning notices.

F. Test

(1) Pressurize Green hydraulic system (Ref. 29-11-00, Servicing).





Sampling Valve
Figure 401

R

EFFECTIVITY: ALL

BA

Printed in England

(2) Check sampling valve for leakage.

(3) Shut down hydraulic power source (Ref. 29-11-00, Servicing).

G. Close-Up

(1) Clean the sampling valve and adjacent area, and make certain that no trace of hydraulic fluid remains.

(2) Make certain that working area is clear of tools and miscellaneous items of equipment.

(3) Close access doors 151DB, 153BB.

(4) Remove access platforms.

HYDRAULIC TANK ASSEMBLY - REMOVAL/INSTALLATION

WARNING : MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE, MAKE CERTAIN THAT THE TRAVEL RANGES OF THE ELEVONS ARE CLEAR.

1. General

The Green system hydraulic tank is located in zone 153 and is accessible through door 153AB.
This topic describes the removal/installation procedure for :

- The complete tank assembly
- The removable electric sub-assembly of the quantity transmitter/direct reading indicator assembly.

2. Tank Assembly - Hydraulic

A. Equipment and Materials

DESCRIPTION	PART NO.
Drain Hose - Hydraulic Tanks	D925190000
Circuit Breaker Safety Clips	
Blanking Plugs/Caps for Hydraulic Lines	
Access Platform - 9 ft.8 in (2.96 metres)	
Containers	

R

B. Prepare

(1) Open access door 153AB and 153BB under fuselage and depressurize Green system tank.

(2) Open access door 151DB under fuselage, and depressurize Green system by actuating control lever of associated pressure relief and manual unloading valve.

(3) Trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
GRN TANK CONTENTS IND	13-215	D 41	E 8
HYD GRND CHECK OUT SEL VALVE CONT	15-216	M626	F22
HYD TANK COMPR CONT	15-215	M602	D 8
BLUE GRN LL LP O/HEAT IND	15-216	G263	D20
R ** ON A/C 001-006 HYD FLUID TEMP IND	15-215	D220	D 9

(4) Drain Tank

(a) Remove the two plugs from unions (4) and (5) on drain cock (6).

(b) Connect tank drain hose to union (4).

(c) Loosen set screw inside union (5) and allow fluid to drain into container provided until tank is completely drained.

(d) Disconnect tank drain hose of union (4).

(e) Tighten the set screw inside union (5) and install the two plugs on unions (4) and (5) of drain cock (6).

C. Remove

(1) Disconnect the electrical connectors from tank.

(2) Mark and then remove clamps securing hydraulic lines on tank.

(3) Remove all lines connected to tank.

(4) Cap open line ends and tank ports.

(5) Uncouple attaching straps (2) and (3).

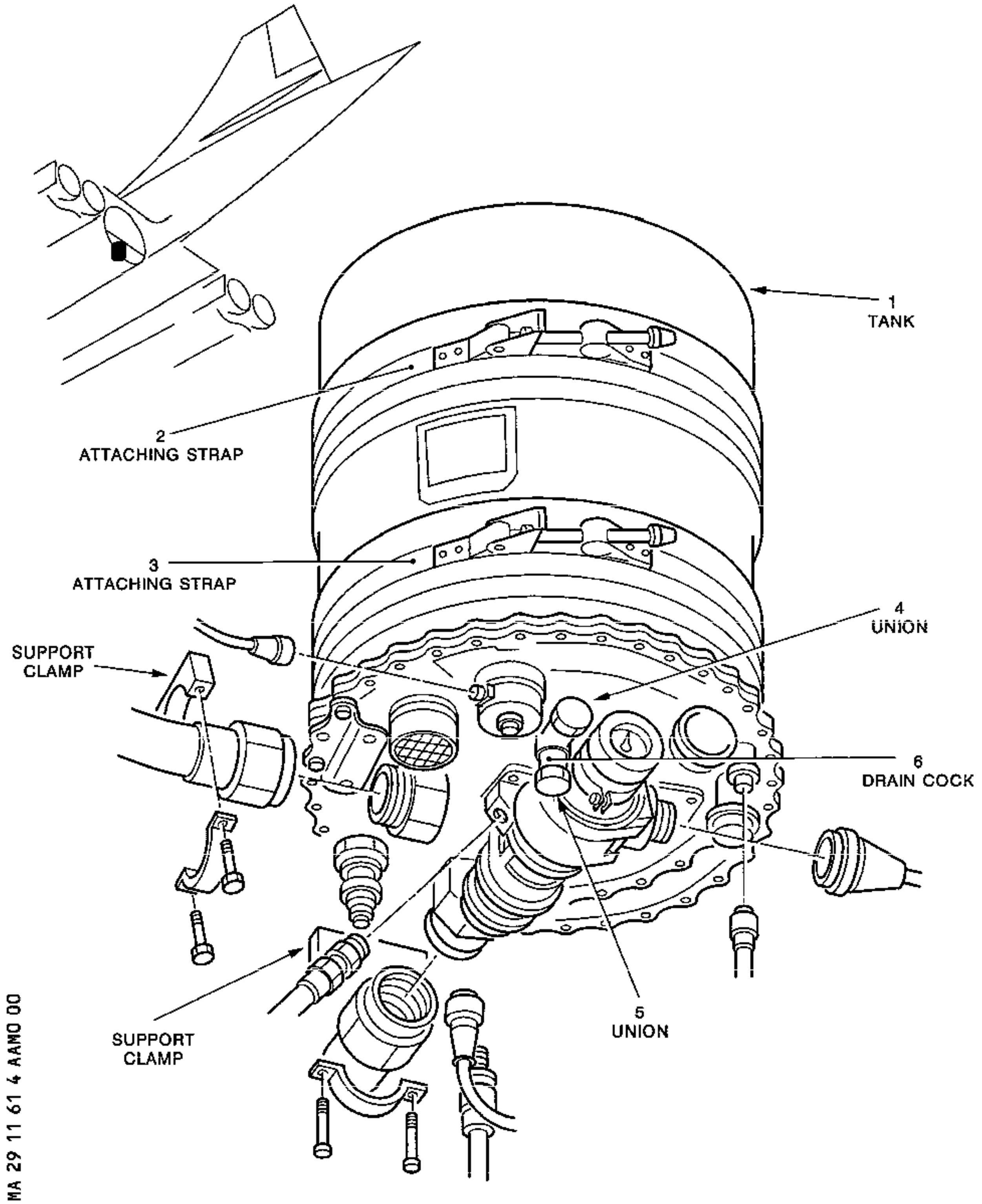
(6) Remove tank (1).

D. Preparation of Replacement Component

(1) Check that replacement unit is filled with product No. 11 (Ref. 20-30-00).

PRINTED IN ENGLAND

PRINTED IN ENGLAND



Hydraulic Tank Assembly
Figure 401

E. Install

(1) Drain replacement tank.

(2) Position tank and attach to its supports by means of straps (2) and (3). Do not tighten.

(3) Connect electrical connectors to tank.

(4) Remove blanking caps.

(5) Position and connect hydraulic lines but do not tighten.

(6) Install line support clamps.

(7) Fully secure tank by tightening straps (2) and (3).

(8) Tighten all hydraulic lines.

(9) Tighten line support clamps.

R WARNING: IF TANK HAS BEEN DRAINED THROUGH DRAIN COCK, TIGHTEN
R THE SET SCREW AND INSTALL THE TWO PLUGS.

(10) Replenish tank (Ref. 12-12-29).

F. Tests

(1) Functional test (Ref. 29-32-00 and 29-33-00, Adjustment/Test).

(2) After tests, check for external leakage on lines.

G. Close-up

(1) Remove safety clips and tags, and reset circuit breakers.

(2) Make certain that working area is clear of tools and miscellaneous items of equipment.

(3) Clean hydraulic tank and adjacent area, and make certain that no trace of hydraulic fluid remains.

(4) Close access doors.

(5) Remove access platform.

3. Electric Sub-Assembly - Quantity Transmitter/Direct Reading Indicator

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform 9 ft. 8 in. (2.96 m)	
Circuit Breaker Safety Clips	

R B. Prepare

(1) Open access doors 153AB and 153BB under fuselage.

(2) Trip, safety and tag the following circuit breaker :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
GRN TANK CONTENTS IND	13-215	D 41	E 8

C. Remove
(Ref. Fig. 402)

(1) Disconnect electrical connector (2)

(2) Loosen attaching screw on clamp (1), disengage clamp from bracket (5).

(3) Loosen attaching screw on clamp (4), disengage clamp from mating flanges of hydraulic sub-assembly (6) and electric sub-assembly (3).

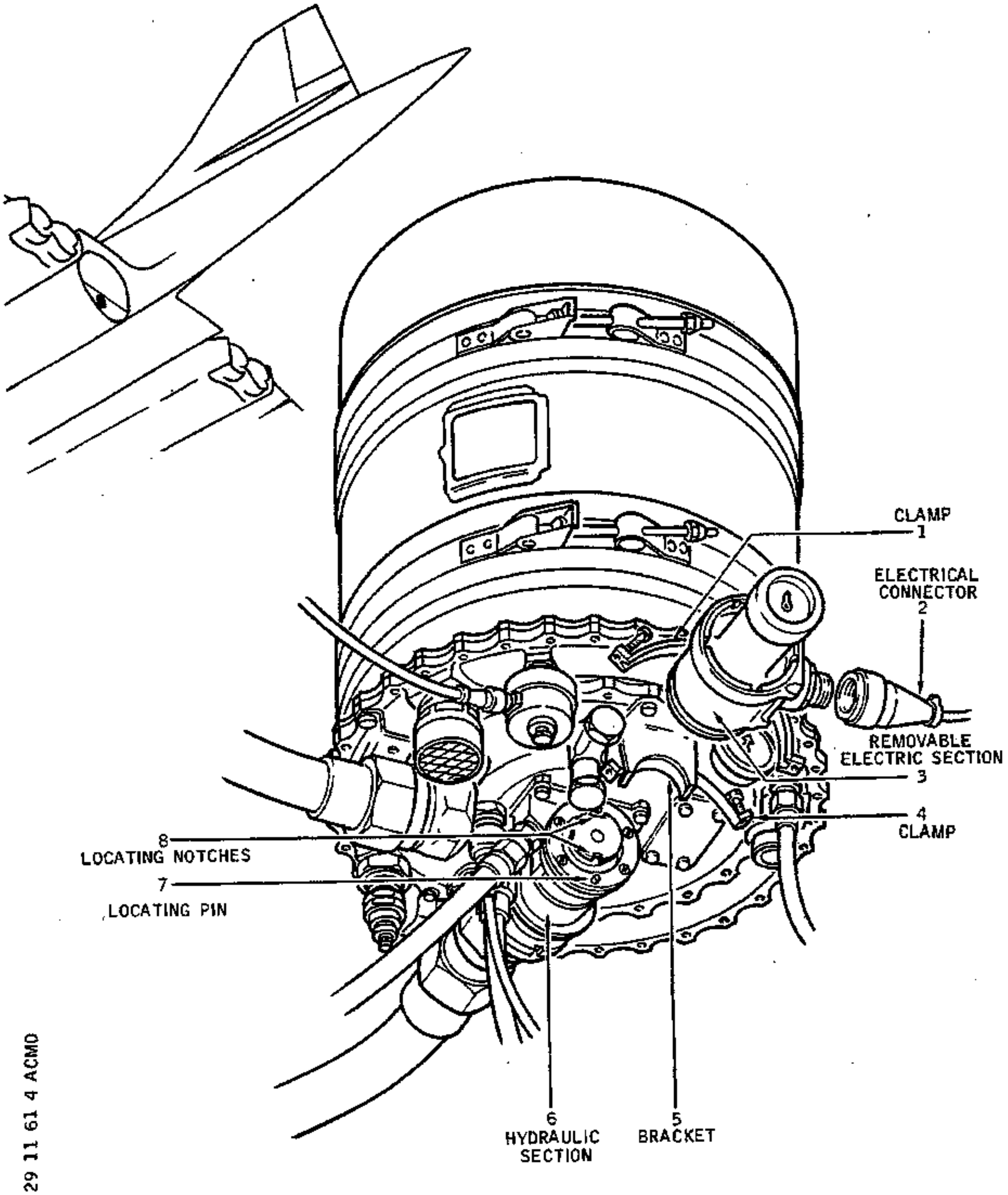
(4) Remove electric sub-assembly (3), remove and retain clamps (1) and (4).

D. Preparation of Replacement Component

NOTE : It is essential to use electric and hydraulic sub-assemblies intended for the Green tank.

E. Install

(1) Position removable electric sub-assembly (3) on fixed hydraulic sub-assembly.



CMA 29 11 61 4 ACMO

Removable Electric Sub-Assembly of Tank Quantity
Transmitter/Direct Reading Indicator Assembly
Figure 402

R

NOTE : Locating pin (7) on mating flange of hydraulic sub-assembly, and locating notches (8) on movable drive parts, ensure foolproof installation of electric sub-assembly on hydraulic sub-assembly.

(2) Install clamp (4) and fully tighten attaching screw.

(3) Install clamp (1) and fully tighten attaching screw.

(4) Connect electrical connector (2).

(5) Remove safety clip and tag and reset circuit breaker D41.

F. Test

Perform a functional test (Ref. 29-32-00, Adjustment/Test).

G. Close-Up

(1) Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(2) Close all access doors.

(3) Remove access platform.

LP FILTER (RESERVOIR RETURN) - REMOVAL/INSTALLATION

WARNING : MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE, MAKE CERTAIN THAT THE TRAVEL RANGES OF THE ELEVONS ARE CLEAR.

1. General

Removal for Replacement.

2. LP Filter

A. Equipment and Materials

DESCRIPTION	PART NO.
Drain Hose - Hydraulic Tanks	D925190000
Container - Capacity 15 litres (3.70 US Gal, 3.30 Imp. Gal)	
Blanking Plugs/Caps for Hydraulic Lines	
Access Platform - 9 ft.8 in (2.96 metres)	
Reservoir Pressurizing Equipment (Air Bottle with Pressure Reducing Valve)	
Circuit Breaker Safety Clips	
Air/Hydraulic Tool Kit	
Drainage Equipment - LP Filter - Hydraulic Reservoir	D921596000

B. Prepare

(1) Open access doors 153AB and 153BB under fuselage and depressurize Green system reservoir by opening associated depressurization valve.

(2) Open access door 151DB under fuselage and depressurize Green system by actuating control lever of associated

pressure relief and manual unloading valve.

(3) Connect reservoir pressurizing equipment to ground connector (0191) zone 153.

(4) Remove mounting bracket (5) at frame 73.

(5) Trip, safety and tag the following circuit breakers:

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
HYD GRND CHECK OUT SEL VALVE CONT	15-216	M 626	F22
HYD TANK COMPR CONT	15-215	M 602	D 8

C. Remove

(1) Partially drain Green system reservoir.

(a) Remove the two plugs from reservoir drain valve.

(b) Connect reservoir drain hose to valve.

(c) Loosen drain valve set screw and allow fluid to drain into container provided.

CAUTION : DO NOT DRAIN THE RESERVOIR COMPLETELY, OR THE BELLOWS, MADE OF JOINED SEGMENTS, MAY BE DAMAGED.

(2) Drain filter (4).

(a) Remove lock pin (7).

(b) Position reservoir LP filter drainage equipment under filter.

(c) Loosen knurled knob (6) and allow fluid to flow until filter is completely drained.

(3) Remove nuts (11) from links (8), remove screws and washers. Remove and retain clamp (12) and the two half-shells (10).

(4) Disconnect all lines connected to filter.

(5) Remove split pins and nuts (2) from bolts (1) which

attach filter to mountings.

(6) Support filter and remove bolts (1). Remove and retain shims.

(7) Raise filter slightly, disconnect line connecting filter to reservoir, remove filter.

(8) Cap all open line ends.

D. Preparation of Replacement Component

E. Install

(1) Remove blanking caps from hydraulic lines.

(2) Position filter on its mounting, connect line between filter and reservoir.

(3) Install filter using shims which are inserted between filter attachment lugs and those on the mounting.

NOTE : The thickness of the shims between each attachment lug must not exceed 0.016 in (0.41 mm).

(4) Secure filter to its mounting with bolts (1) washers and nuts (2) ; safety nuts with split pins (3).

(5) Connect lines to filter.

(6) Install two half-shells (10), clamp (12) and links (8).

(7) Replenish reservoir (Ref. 12-12-29).

(8) Close and wirelock reservoir depressurization valve.

(9) Pressurize reservoirs to 4.8 bars (70 psi) using pressurizing equipment.

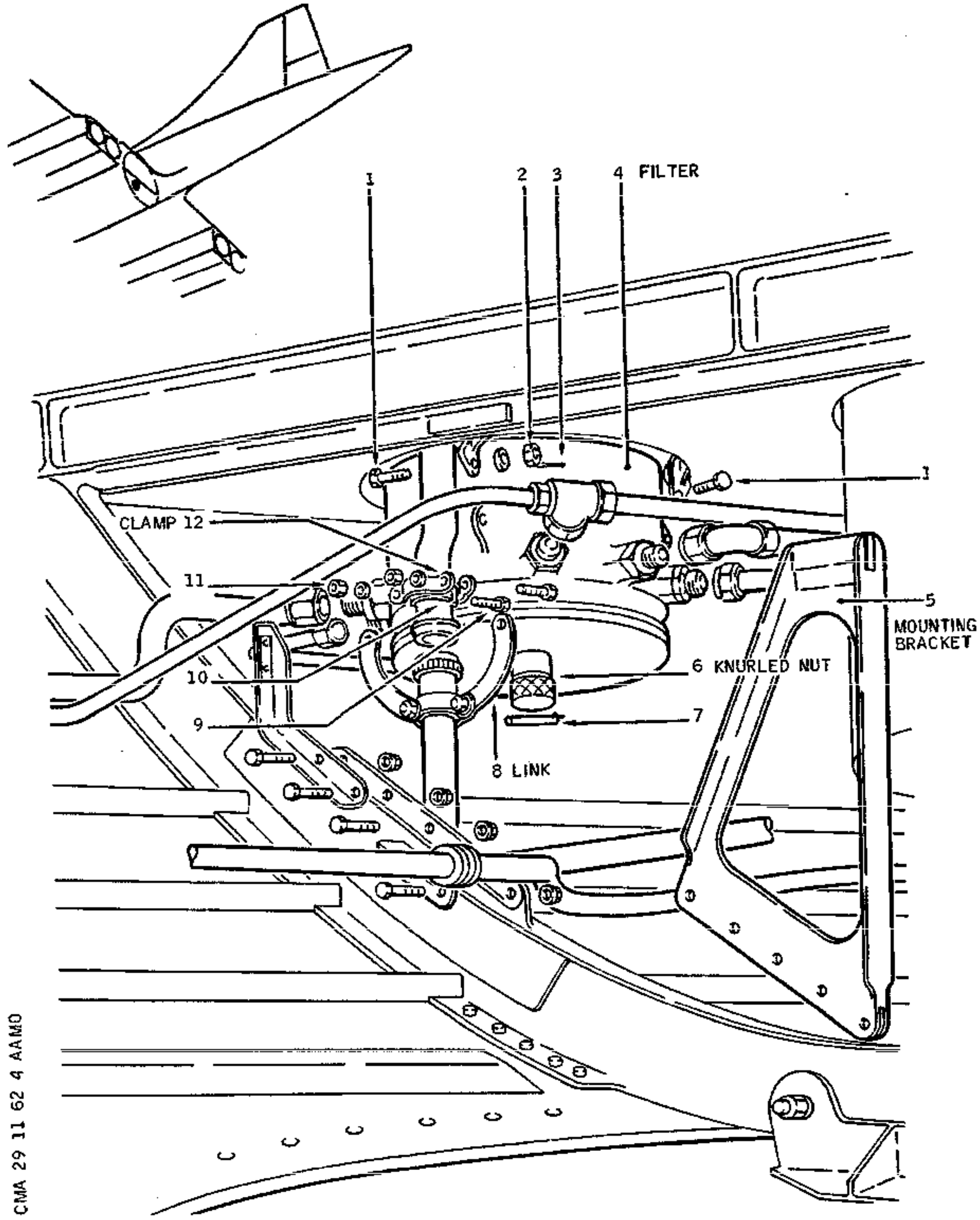
(10) Check hydraulic lines for external leakage.

F. Tests

G. Close-Up

(1) Clean filter and adjacent area and make certain that no trace of hydraulic fluid remains.

(2) Disconnect pressurizing equipment.



LP Filter (Reservoir Return)
Figure 401

(3) Install mounting bracket (5) at frame 73.

(4) Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(5) Close access doors.

(6) Remove access platform.

(7) Remove safety clips and tags and reset circuit breakers

Printed in England

PRINTED IN ENGLAND

ENGINE DRIVEN HYDRAULIC PUMP - REMOVAL/INSTALLATION

WARNING: MAKE CERTAIN THAT THE POSITIONS OF NOSE AND MAIN GEAR DOORS CORRESPOND WITH THE ACTUAL POSITIONS OF THE RESPECTIVE OPERATING HANDLES.
HANDLE LOCKED, INDICATOR PLATE SHOWING WHITE : DOORS CLOSED.
HANDLE LOCKED, INDICATOR PLATE SHOWING RED : DOORS OPEN.

MAKE CERTAIN THAT THE LANDING GEAR POSITION INDICATED ON THE GEARS POSITION INDICATING UNIT CORRESPONDS WITH THE ACTUAL POSITION OF THE LANDING GEAR.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE, MAKE CERTAIN THAT THE TRAVEL RANGES OF THE CONTROL SURFACES ARE CLEAR.

BEFORE PRESSURIZING HYDRAULIC SYSTEMS, CHECK THAT ALL CONTROLS ARE SET TO CORRESPOND WITH THE ACTUAL POSITION OF THE SERVICES THEY OPERATE.

MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

1. General

This topic details the removal/installation procedure for the engine-driven hydraulic pump and for the pump drive shaft. The procedure applies to both engine-driven pumps in the Green system.

RB CAUTION: WHEN REPLACING THE PUMP FOR ANY REASON THE CASE DRAIN
RB FILTER ELEMENT MUST ALSO BE CHANGED. THIS MUST BE
RB DONE BEFORE THE REPLACEMENT PUMP IS OPERATED. REFER
RB TO 29-00-00, GENERAL SERVICING, PARAS. 2 AND 3,
RB FILTER ELEMENTS.

2. Pumps - Engine-Driven Hydraulic

A. Equipment and Materials

DESCRIPTION	PART NO.
Special products (Ref. 20-30-00, No. 118)	-
Corrosion-resistant steel lockwire, dia. 0.028 in (0.7 mm).	-
Oils (Ref. 20-30-00, No. 021)	-
Electrical ground power unit	-

DESCRIPTION	PART NO.
Mobile access platform for under nacelle, 5 ft 11 in (1.8 m)	-
Blanking plug/caps for hydraulic unions	-
Hydraulic fluid (Ref. 20-30-00, No. 011)	-
Container for recovery of hydraulic fluid	-

PRINTED IN ENGLAND

B. Prepare

(1) Open panel 415AB for pump mounted on engine 1, or panel 426AB for pump mounted on engine 2 (Ref. 71-00-00, Servicing).

(2) Depressurize Green hydraulic system (Ref. 29-11-00, Servicing).

(3) Depressurize Green hydraulic tank (Ref. 29-13-00, Servicing).

(4) Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing).

(5) Make certain that the following circuit breakers are set:

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
ENGINE 2 SHUT OFF VALVES CONT	2-213	W 7	B15
ENG 1 SHUT OFF VALVES CONT		W 3	F15
SHUT OFF VALVES IND	15-216	W 5	C18

(6) On Flight Engineer's HYDRAULIC MANAGEMENT panel, place control switch of pump to be removed in SHUT position. Check that associated SHUT OFF VALVES magnetic indicator, located on same panel, displays SHUT.

(7) Trip, safety and tag the following circuit breakers:

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
Engine No. 1 Pump ENG 1 SHUT OFF VALVES CONT	2-213	W 3	F15
ENG 1 GRN PUMP CONT IND	15-215	M 271	D 6
Engine No. 2 Pump ENG 2 SHUT OFF VALVES CONT	2-213	W 7	B15
ENG 2 GRN PUMP CONT IND	15-215	M 272	D 7

WARNING: DISPLAY WARNING NOTICE ON ENGINE 1, PROHIBITING PRESSURIZATION OF GREEN HYDRAULIC SYSTEM BY HYDRAULIC GROUND POWER UNIT.

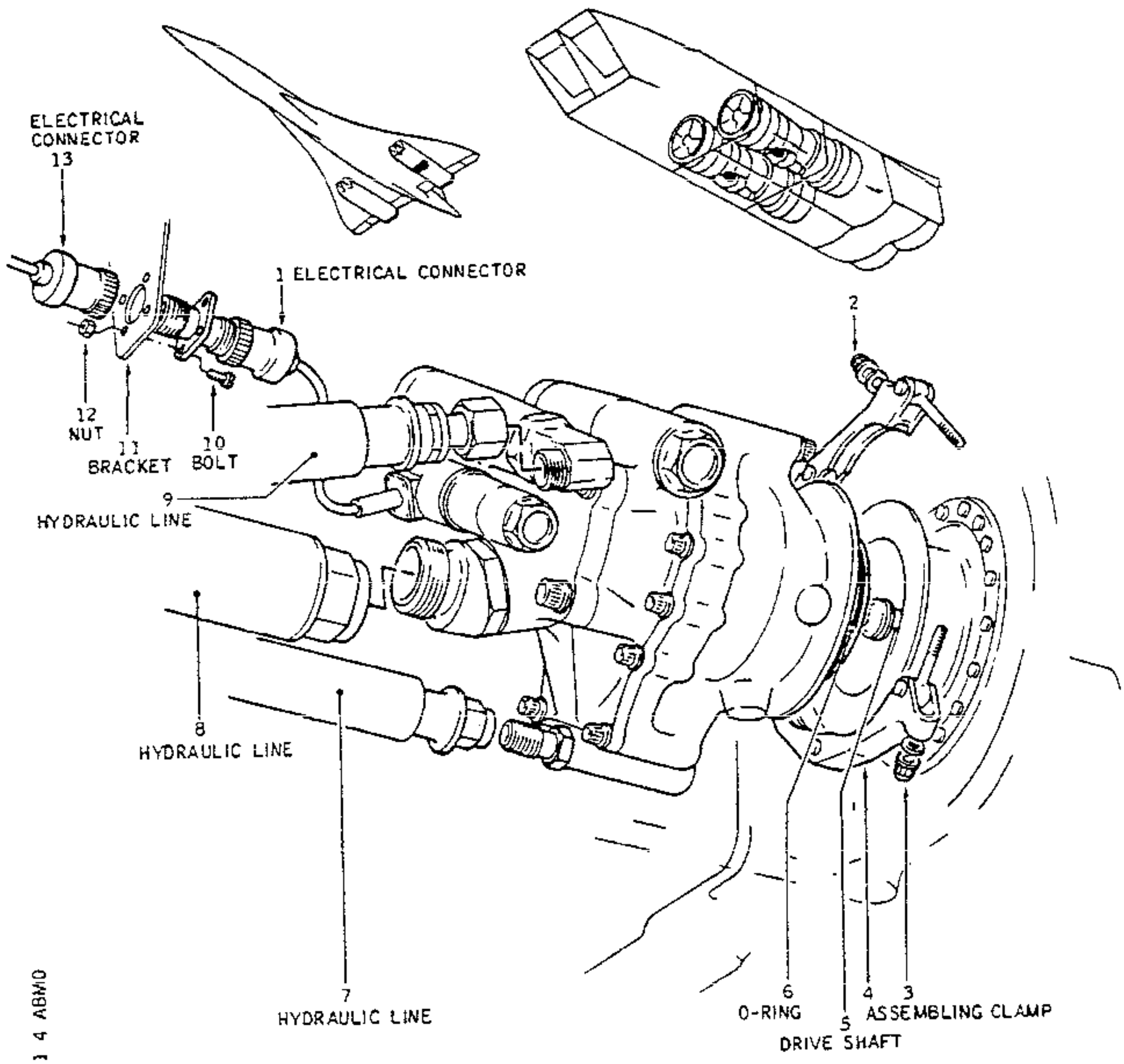
DISPLAY A WARNING NOTICE AT FLIGHT ENGINEER'S STATION PROHIBITING USE OF GROUND PRESSURIZING SYSTEM ELECTRIC PUMPS.

C. Remove
(Ref. Fig. 401)

**ON A/C 001-005,

(1) Disconnect lines (7), (8) and (9) from pump. Cap open ends of lines and of pump unions.

PRINTED IN ENGLAND



R

Engine-Driven Hydraulic Pump
Figure 401

** ON A/C 006-007

(1) Cut and remove lockwire and disconnect lines (7), (8) and (9) from pump. Cap open ends of lines and of pump unions.

(2) Disconnect electrical connector.

(a) Cut and remove lockwire, disconnect electrical connector (13).

(b) Remove nuts (12) and bolts (10).

(c) Remove electrical connector (1) from bracket (11).

(3) Remove nuts (2) and (3), support pump and remove assembling clamp (4).

(4) Remove pump horizontally, so as not to damage splines of drive shaft (5).

(5) Retain assembling clamp (4) and check its condition.

B D. Preparation of Replacement Component

B (1) If no contamination is suspected change case drain filter
B element. (Ref. 29-00-00, General Servicing, para. 3, Filter
B Elements).

B (2) If contamination is suspected carry out flush. Change
B pressure, case drain and low pressure filter elements.
B (Ref. 29-00-00, General Servicing, paras. 2 and 3, Filter
B Elements).

E. Install

(1) Check pump O-ring (6) for correct condition. Replace if necessary and lubricate with product No. 118.

(2) Install pump, ensuring correct position on drive shaft and on mounting plate guide pin.

(3) Install assembling clamp.

(a) Make certain that tapered surfaces, threads of nuts, and bolts, and mating surfaces of nuts, washers and spherical seatings are perfectly clean. Then apply a thin film of engine oil to the surfaces, enough to cover them. Wipe off any excess.

PRINTED IN ENGLAND

(b) Install assembling clamp (4) on flange, with spring washers under the nuts.

(c) Check rundown torque of nuts. It should be between 6 and 20 lbf in (0.065 and 0.457 mdaN).

(d) Tighten inner nut (2). Torque to between 55 and 60 lbf in (0.62 and 0.68 mdaN). Using a leather mallet or fibre drift, tap each segment in turn to ensure even seating of the clamp.

(e) Re-torque inner nut (2) only, to 55-60 lbf in (0.62 to 0.68 mdaN) and again tap each segment in turn.

(f) Proceed with final torque tightening of inner nut (2) to between 55 and 60 lbf in (0.62 and 0.68 mdaN).

(g) Proceed with final torque tightening of outer nut (3) to between 55 and 60 lbf in (0.62 and 0.68 mdaN).

CAUTION: WHEN THESE OPERATIONS HAVE BEEN CARRIED OUT THE TORQUE LOAD ON THE INNER NUT WILL HAVE BEEN REDUCED. DO NOT RE-TIGHTEN.

** ON A/C 001-005,

(4) Connect hydraulic lines (7), (8) and (9) to pump.

Torque as follows:
Line (7) : 160 - 180 lbf in (1.808 - 2.034 mdaN)
Line (8) : 450 - 500 lbf in (5.085 - 5.650 mdaN)
Line (9) : 500 - 800 lbf in (5.650 - 9.040 mdaN)

** On A/C 006-007,

(4) Connect hydraulic lines (7), (8) and (9) to pump

Torque as follows:
Line (7) : 160 - 180 lbf in (1.808 - 2.034 mdaN)
Line (8) : 450 - 500 lbf in (5.085 - 5.650 mdaN)
Line (9) : 500 - 800 lbf in (5.650 - 9.040 mdaN)
Wirelock (Ref. 20-21-13).

PRINTED IN ENGLAND

R

(5) Connect electrical connector

(a) Fit electrical connector (1) in bracket (11)

(b) Install and tighten bolts (10) and nuts (12)

(c) Connect electrical connector (13) to connector (1)

(d) Wirelock (Ref. 20-21-13)

B NOTE : Refer to M.M. Chapter 71-50-00
B Removal/Installation for connector
B tightening procedure.

(6) Remove safety clips and tags and reset circuit breakers tripped in preparation procedure.

(7) On Flight Engineer's HYDRAULIC MANAGEMENT panel, place control switch of installed pump in ON position. Check that SHUT OFF VALVES and PUMPS magnetic indicators located on same panel display OPEN and ON respectively.

(8) Bleed pump suction line (Ref. 29-11-00, Servicing).

(9) Replenish hydraulic tank as required (Ref. 12-12-29).

(10) De-energize aircraft electrical network and disconnect electrical ground power unit.

F. Test

(1) Check operation of pumps during ground running or motoring of associated engine (Ref. 71-00-00, Adjustment/Test).
During ground running or motoring procedures :

(a) Make certain that Green system pressure increases to rated value of 4000 psi (275 bars).

(b) Press pump L/PRESS caption light on Flight Engineer's HYDRAULIC MANAGEMENT panel. The pressure must drop, thus indicating that pump depressurization solenoid is operating correctly.

(2) After engine ground running or motoring procedures, check installation for leakage.

G. Close-Up

(1) Clean the area adjacent to the pump and make certain that no trace of hydraulic fluid remains.

(2) Make certain that working area is clear of tools and miscellaneous items of equipment.

(3) Close access panels and doors.

(4) Remove access platform.

3. Shaft - Drive

A. Equipement and Materials

DESCRIPTION	PART NO.
Special Materials (Ref. 20-30-00, No.118)	
Oil (Ref. 20-30-00, No.021)	
Extractor - Quill Drive Shaft	E925099000

B. Prepare

(1) Remove engine-driven hydraulic pump (Ref. paragraph 2.)

R
R
R

R

C. Remove
R (Ref. Fig. 402)

(1) Remove circlip (1).

(2) Remove drive shaft (2) using extractor E925099000.

NOTE: The extractor may also be used for removing a broken drive shaft.

D. Preparation of Replacement Component

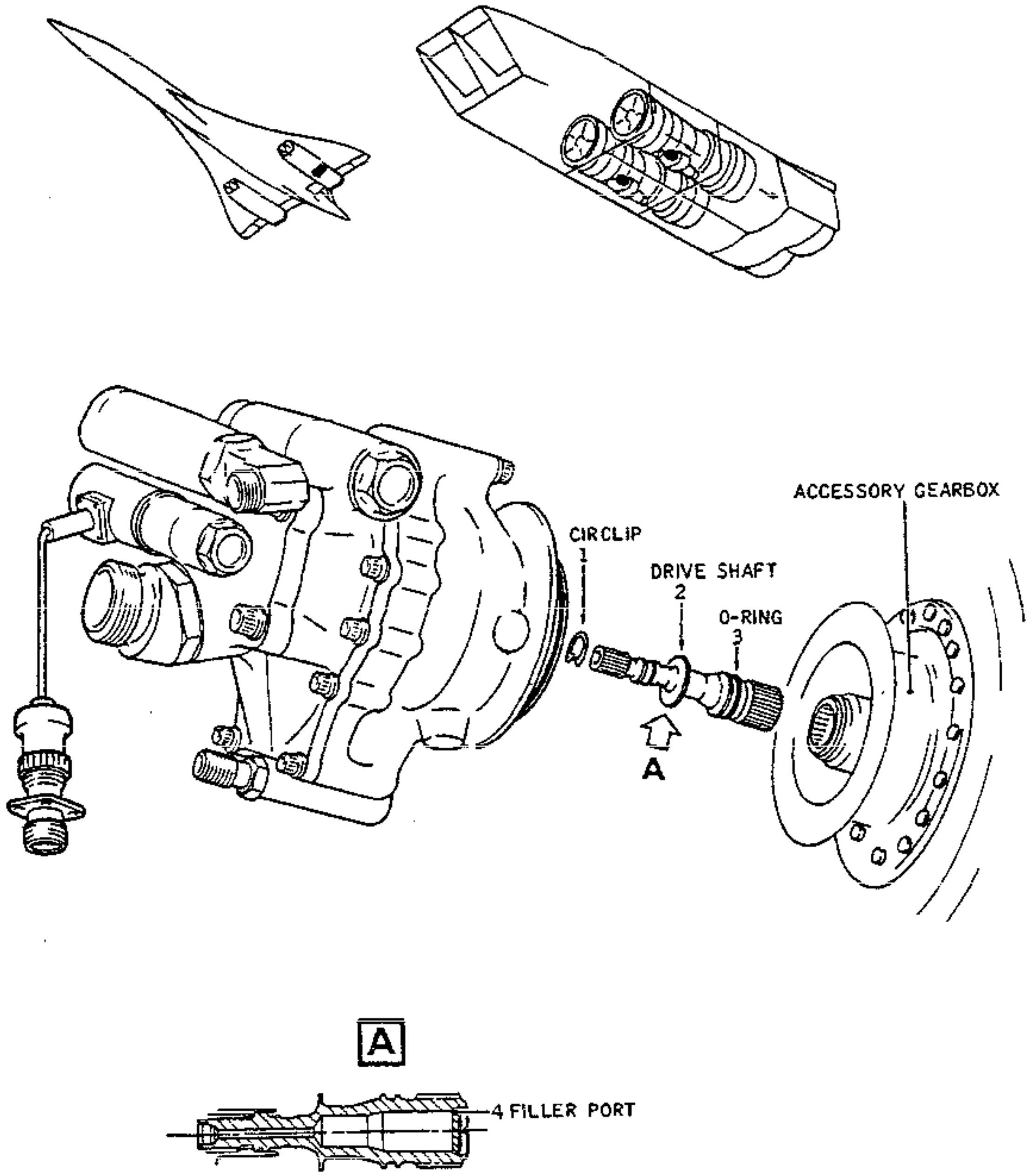
(1) Lubricate O-ring (3) with product No.118.

(2) Hold drive shaft horizontally so that filler port (4) is on uppermost side of shaft.

(3) Fill shaft to overflowing with product No.021. Also lubricate outside of shaft with product No.021.

E. Install

(1) Install shaft in housing on accessory gearbox, maintaining filler valve uppermost.



CMA 29 11 71 4 ADMO

R

Pump Drive Shaft
Figure 402

(2) Install circlip (1)

(3) Install engine-driven pump (Ref. paragraph 2).

F. Test

Proceed with test detailed in engine-driven pump removal/ installation procedure.

G. Close-Up

The close-up steps are those for the engine-driven pump removal/installation procedure.

B 4. Off-Load Solenoid Replacement

B A. Prepare

B
B (1) Proceed with preparation detailed in engine-driven
B pump removal/installation procedure (Ref. para. 2.B.).

B B. Remove

B (1) Disconnect electrical connector (5).

B (2) Remove two Allen headed bolts securing solenoid to
B pump and discard.

B (3) Remove solenoid and cable assembly.

B C. Preparation of Replacement Component

B (1) Install seals.

B (2) Lubricate with clean Hydraulic oil (Ref. 20-30-00,
B Product No.11).

B D. Install

B (1) Secure solenoid to pump with two new Allen headed
B bolts.

B (2) Torque tighten bolts to between 5.7 and 6.8 Nm (50 and
B 60 lbf in).

B (3) Reconnect connector (5).

B (4) Wire lock Allen headed bolts.

B E. Test

B (1) Proceed with test detailed in engine-driven pump
B Removal/Installation procedure (Ref. para.2.F.).

B F. Close-Up

B (1) The close-up steps are those for the engine-driven
B pump Removal/Installation procedure (Ref. para. 2.G.).

PRINTED IN ENGLAND

LOW PRESSURE SWITCH - REMOVAL/INSTALLATION

1. General

A pressure switch is mounted on the delivery line of each engine-driven hydraulic pump to indicate any low pressure condition which may occur in the pump. The pressure switches are located in the wing between spars 64 and 65 :
- Between ribs 15 and 16 for engine 1 pump pressure switch (0125)
- Between ribs 18 and 19 for engine 2 pump pressure switch (0124)

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform, 14 ft. 7 in. (4.440m)	
Wing Protective Mat	
Electrical Ground Power Unit	

B. Prepare

(1) Open access door 153BB under fuselage and depressurize Green system tank (Ref. 29-13-00, Servicing).

(2) Open access door 151DB under fuselage and depressurize Green system (Ref. 29-11-00, Servicing).

(3) Trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
ENG 1 GRN PUMP CONT IND	15-215	M 271	D 6
ENG 2 GRN PUMP CONT IND		M 272	D 7

(4) Connect electrical ground power unit (Ref. 24-41-00, Servicing).

(5) Position wing protective mat.

(6) Open access doors to pressure switches :
- Access door 532AT for engine 1 pump pressure switch

- Access door 531AT for engine 2 pump pressure switch

WARNING : DISPLAY WARNING NOTICES ON ENGINE 1 PROHIBITING PRESSURIZATION OF GREEN HYDRAULIC SYSTEM BY HYDRAULIC GROUND POWER UNIT.
DISPLAY A WARNING NOTICE AT FLIGHT ENGINEER'S STATION PROHIBITING USE OF GROUND PRESSURIZING SYSTEM ELECTRIC PUMPS.

C. Remove

(1) Disconnect electrical connector (1).

(2) Remove attaching screws and remove clamps (3).

(3) Engine 1 pump low pressure switch (0125) :
- Remove pressure switch from elbow (5)
Engine 2 pump low pressure switch (0124) :
- Unscrew coupling nut (2) and remove pressure switch.

(4) Cap open line ends and plug ports.

D. Install

(1) Remove blanking caps and plugs.

(2) Engine 1 pump low pressure switch (0125) :
- Check that O-ring (4) is installed and in correct condition.
- Install pressure switch on elbow (5) and tighten, taking care not to damage O-ring (4).
Engine 2 pump low pressure switch (0124) :
- Position pressure switch, install and tighten coupling nut (2).

(3) Pressurize hydraulic tanks (Ref. 29-13-00, Servicing).

(4) Slightly loosen coupling nut (2) on pressure switch to bleed line of any air.
Tighten coupling nut (2).

(5) Clean coupling nut and adjacent area, making certain that no trace of hydraulic fluid remains.

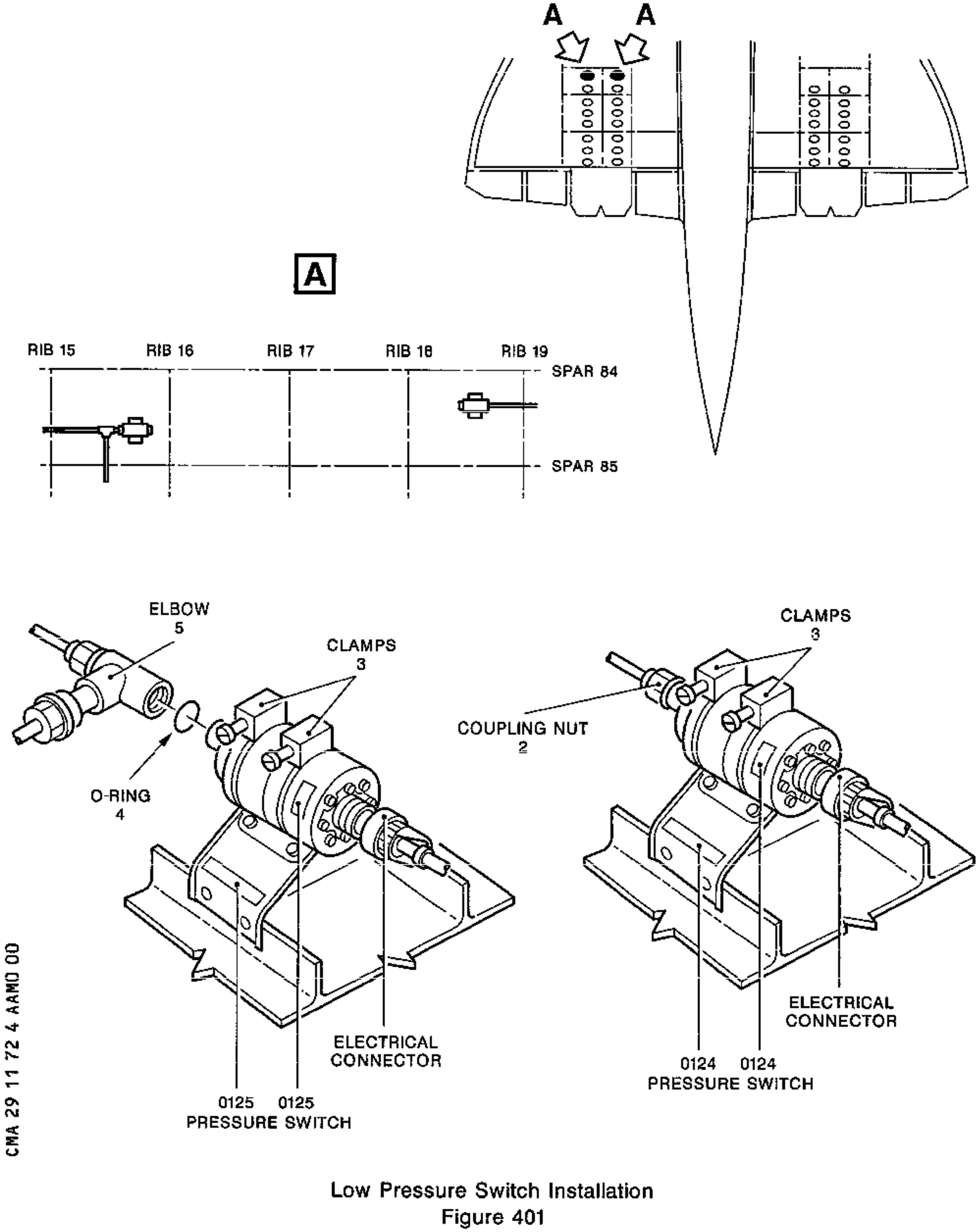
(6) Install clamps (3) and tighten attaching screws.

(7) Connect electrical connector (1).

E. Tests

(1) Energize aircraft electrical network (Ref. 24-41-00,

PRINTED IN ENGLAND



Low Pressure Switch Installation
Figure 401

Servicing).

(2) Remove safety clips and tags and reset the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
ENG 1 GRN PUMP CONT IND	L5-215	M 271	D 6
ENG 2 GRN PUMP CONT IND		M 272	D 7

(3) On Flight Engineer's HYDRAULIC MANAGEMENT panel, engine-driven pump L/PRESS warning lights must come on.

(4) Test pressure switch operation

(a) Engine 1 pump low pressure switch (0125) :

(a1) Pressurize Green hydraulic system (Ref. 29-11-00, Servicing, Green System Pressurization Using Hydraulic Ground Power Unit).
- On Flight Engineer's HYDRAULIC MANAGEMENT panel, L/PRESS-1 warning light must go off when pressure increases to 140 + 50/- 10 bars (2030 + 720/- 145 psi).

(a2) Shut down hydraulic ground power unit
- L/PRESS-1 warning light must come on when pressure decreases to 140 + 10/- 20 bars (2030 + 145/-290 psi).

(a3) Disconnect and remove hydraulic ground power unit (Ref. 29-11-00, Servicing).

(b) Engine 2 pump low pressure switch (0124) : Check this pressure switch during run-up or cranking of Engine 2 (Ref. 71-00-00, Adjustment/ Test).
During run-up or cranking of this engine :

(b1) On Flight Engineers HYDRAULIC MANAGEMENT panel, L/PRESS-2-GREEN warning light must go off. When pressure increases to 140 + 50/ - 10 bars (2030 + 720/-145 psi).

(b2) At end of run-up or cranking L/PRESS-2-GREEN warning light must come on when pressure decreases to 140 + 10/- 20 bars (2030 + 145/

Printed in England

- 290 psi).

(5) De-energize the aircraft electrical network and disconnect electrical ground power unit (Ref. 24-41-00, Servicing).

(6) Check pressure switches for leakage after tests.

F. Close-up

(1) Disconnect and remove electrical ground power unit (Ref. 24-41-00, Servicing).

(2) Close access doors 153BB, 151DB, 532AT or 531AT.

(3) Remove wing protective mat.

(4) Remove warning notices.

(5) Remove access platform.

ENGINE-DRIVEN PUMP DELIVERY FILTERS - REMOVAL/INSTALLATION

WARNING : OBSERVE THE ELECTRICAL SAFETY PRECAUTIONS DETAILED IN 24-00-00, SERVICING.

AN AIR INTAKE MUST NOT BE WORKED ON UNTIL THE SPILL DOORS AND RAMPS OF ALL INTAKES HAVE BEEN ELECTRICALLY AND HYDRAULICALLY ISOLATED, AS FOLLOWS :

(1) LOCKING PINS MUST BE INSTALLED IN THE SPILL DOOR HYDRAULIC SELECTOR VALVES (TWO VALVES FOR EACH INTAKE).

(2) ALL APPROPRIATE CIRCUIT BREAKERS MUST BE TRIPPED AND SAFETIED.

(3) THE ANTI-INTERFERENCE PLATE MUST BE INSTALLED OVER THE "AIR INTAKES" MANAGEMENT PANEL.

1. General

The removal/installation procedure described in this topic applies to both Green system engine-driven pump delivery filters (3126 and 3127).

2. Engine-Driven Pump Delivery Filter

A. Equipment and Materials

DESCRIPTION	PART NO.
Locking Pins - Spill Door Selectors - Bays Nos. 2 and 4	E925037000
Locking Pins - Spill Door Selectors - Bays Nos. 1 and 3	E925038000
Special Materials (Ref. 20-30-00, No.109)	
Anti-Interference Plate - Air Intake Management Panel	E925068000
Access Platform, 5 ft. 11 in. (1.80 m)	
Container for Recovery of Hydraulic Fluid	
Blanking Plugs/Caps (for Hydraulic	

DESCRIPTION	PART NO.
Lines, Filter and Selector Valve)	
Warning Notices	
Circuit Breaker Safety Clips	

B. Prepare

(1) Open access door 153BB and depressurize Green system tank (Ref. 29-13-00, Servicing).

(2) Open access door 151DB and depressurize Green, Blue and Yellow hydraulic systems (Ref. 29-11-00, 29-12-00, 29-21-00, Servicing).

WARNING : DISPLAY WARNING NOTICES ON ENGINES 1, 2 AND 3 PROHIBITING PRESSURIZATION OF BLUE, GREEN AND YELLOW HYDRAULIC SYSTEMS BY HYDRAULIC GROUND POWER UNIT.

DISPLAY A WARNING NOTICE AT FLIGHT ENGINEER'S STATION PROHIBITING USE OF GROUND PRESSURIZING SYSTEM ELECTRIC PUMPS.

DISPLAY A WARNING NOTICE ON THE ENGINE START PANEL AT THE FLIGHT ENGINEER'S STATION PROHIBITING ENGINE STARTING.

POSITION SAFETY BARRIERS TO PREVENT ACCESS TO AIR INTAKE SPILL DOOR TRAVEL RANGE.

(3) Install anti-interference plate E925068000 over Flight Engineer's AIR INTAKES management panel.

(4) Install locking pins E925037000 and E925038000 (Ref. 71-62-00, Servicing).

(5) Trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
Engine 1			
INT 1 MAIN HYD SUP	1-213	1K1950	D 9

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
INT 1 ST'BY HYD SUP	15-216	1K1960	B 8
AICU 1A SUP	2-213	1K2050	D14
AICU 1B SUP	14-216	1K2051	A 5
Engine 2			
INT 2 MAIN HYD SUP	15-215	2K1950	B18
INT 2 ST'BY HYD SUP	1-213	2K1960	E 9
AICU 2A SUP	13-216	2K2050	A 3
AICU 2B SUP	2-213	2K2051	H14
Engines 1, 2, 3 and 4			
HYD GRND CHECK OUT SEL VALVE CONT	15-216	M 626	F22
HYD TANK COMPR CONT	15-215	M 602	D 8

(6) Open access door 411JL for filter 3127, and 421JR for filter 3126.

C. Remove

R (1) Disconnect line (15) from filter and from selector
R valve. Remove ligatures (14) and remove line (15).
Plug/cap open ports and line ends.

R
R (2) Remove cotter pins (13), remove nuts (12).

(3) Remove filter (1) (pull downwards to disengage). Plug open ports.

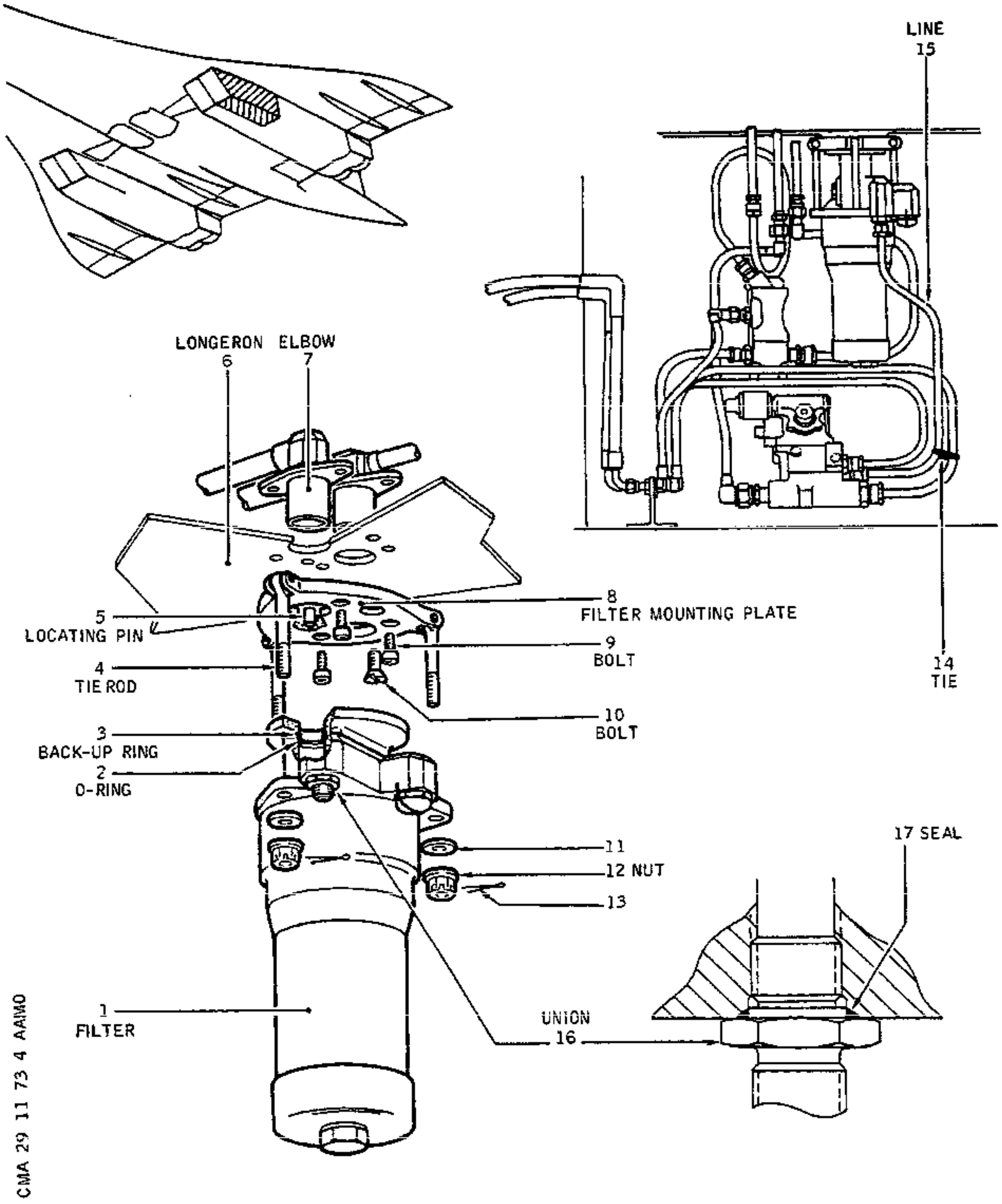
(4) Remove bolts (9).

(5) Remove bolt (10).

(6) Remove filter mounting plate (8).

D. Preparation of Replacement Component

R (1) Remove and discard O-rings (2), replace with new
R O-rings. Back-up rings (3) must be installed on top
R of O-rings (2), as shown in illustration.



R Engine-Driven Pump Delivery Filter
Figure 401

Printed in England

(2) Remove union (16) from removed filter, replace seal (17), and install union (16) on replacement filter.

E. Install

(1) Install filter mounting plate (8) on longeron (6). Check that locating pin (5) is engaged in associated recess on longeron (6). Attach assembly with bolt (10).

(2) Install bolts (9) to attach elbows (7) to filter mounting plate (8). Torque to between 75 and 80 lbf. in. (0.847 and 0.903 m.daN).

NOTE : Bolts (9) shall be coated with product No.109 prior to installation.

**ON A/C 001-001,

(3) Remove blanking plugs, position and install filter (1) on filter mounting plate (8). Install nuts (12) on tie rods (4) and torque to between 120 and 130 lbf.in. (1.355 and 1.468 m.daN). Safety with a cotter pin (13).

R **ON A/C 002-007,

(3) Remove blanking plugs, position and install filter (1) on filter mounting plate (8). Install washers (11). Install nuts (12) on tie rods (4) and torque to between 120 and 140 lbf.in. (1.355 and 1.581 m.daN). Safety with a cotter pin (13).

(4) Remove blanking plugs/caps and connect line (15) to filter and to selector valve. Tighten nuts.

(5) Install ligatures (14) (Ref. 20-23-14).

(6) Clean filter and adjacent area. Make certain that no trace of hydraulic fluid remains.

(7) Remove warning notices.

F. Test

Filter (3126) on engine 2 can only be checked for leakage after engine has been ground run at full power, or motored (Ref. 71-00-00, Adjustment/Test).

To check filter (3127) on engine 1, pressurize Green hydraulic system, using a hydraulic ground power unit (Ref.

29-11-00, Servicing).

G. Close-Up

(1) Replenish hydraulic tank as required (Ref. 12-12-29).

(2) Remove locking pins E925037000 and E925038000 (Ref. 71-62-00, Servicing).

(3) Remove anti-interference plate E925068000.

(4) Remove safety clips and reset circuit breakers.

(5) Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(6) Close access doors 151DB, 153BB, 411JL or 421JR.

(7) Remove access platform.

END OF THIS SECTION

NEXT

BLUE SYSTEM - DESCRIPTION AND OPERATION

1. General

The Blue hydraulic system provides the normal power supply to the following services:

No.3 and No.4 engine air intakes.
The selectors for a half-body of each power flight control unit (PFCU).
The electro-hydraulic selectors for a half-body of each relay jack.
One artificial feel jack on each of the three axes.
The fuel transfer pump hydraulic motor selector.

PRINTED IN ENGLAND

2. Description
R ON A/C 001-006 (Ref. Fig. 001)
R ON A/C 007-007 (Ref. Fig. 001A)

R After SB 29-041 For A/C 001-005 (Ref. Fig. 001B)

A. The Blue system includes the following components:

One hydraulic tank assembly (3200).
One tank de-aerator safety valve (0197).
Two heat exchangers (3218) and (3217).
Two shut-off valves (3219) and (3220).
Two self-regulating engine-driven pumps (0874) and (0875).
Non-return valve (1352).
Two low pressure switches (0224) and (0225).
Non-return valve (5126).

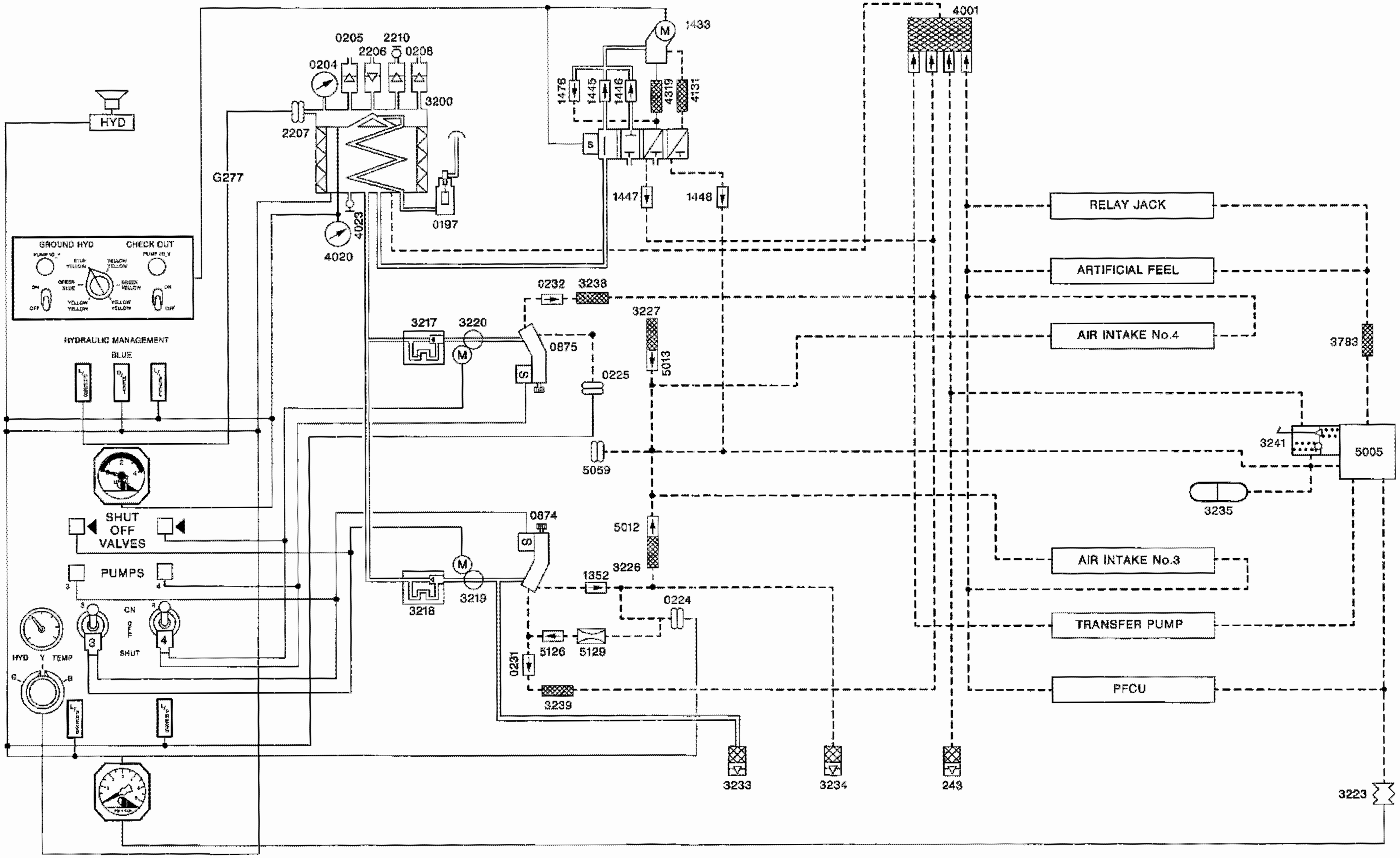
After SB 29-041 For A/C 001-005

Two pulse dampers (5150) and (5151).
Restrictor (5129).
Two HP micronic filters (3226) and (3227).
Two HP filter mounting plates (5012) and (5013) with incorporated non-return valve.
Pressure switch (5059) (air intake monitoring).
One non-return valve (1448).
HP manifold (5005).
Pressure relief and manual unloading valve (3241).
Accumulator (3235).
Pressure transmitter (3223).
HP filter (3783).
Three LP non-return valves (0231), (0232) and (1447).

PRINTED IN ENGLAND

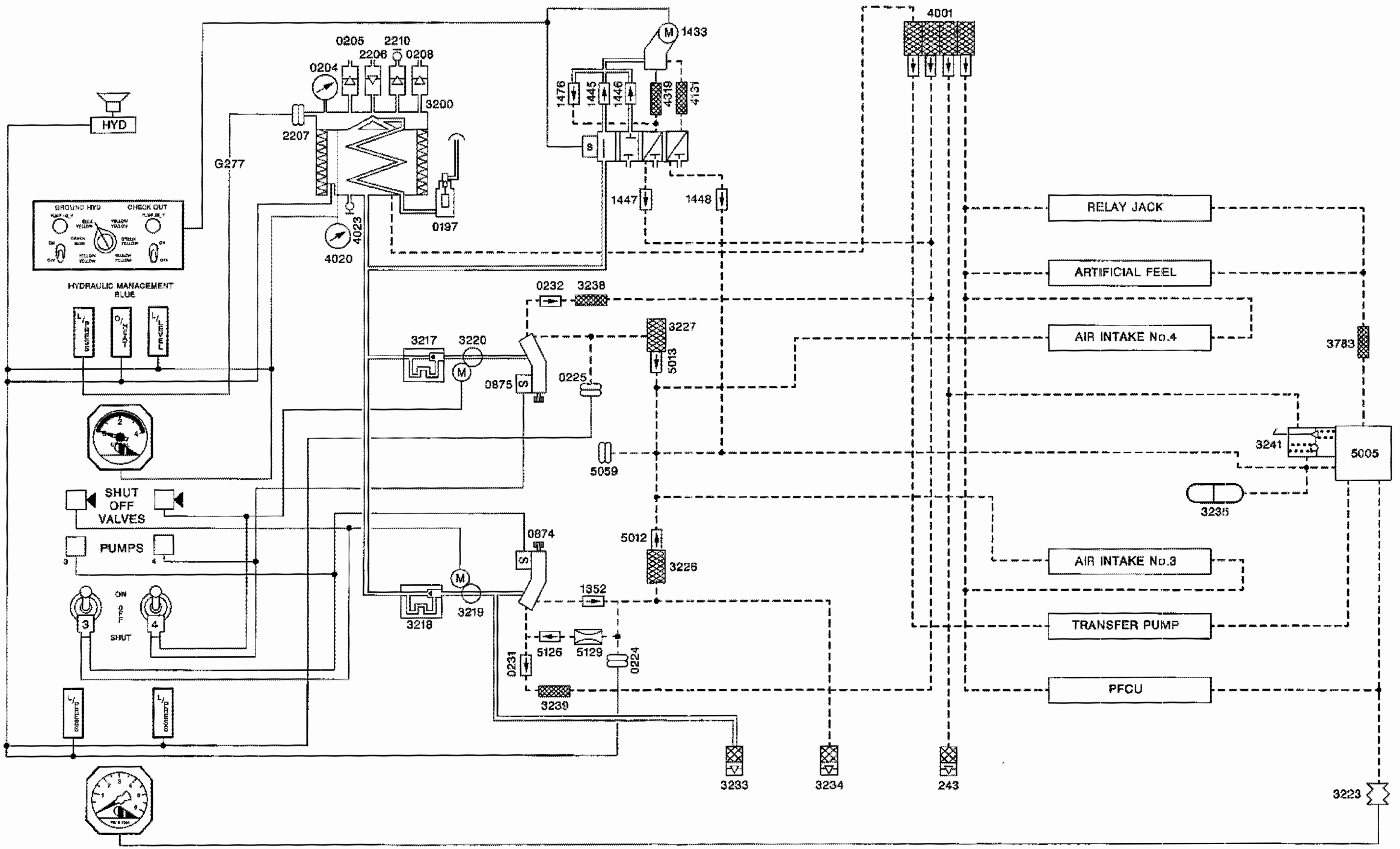
INTENTIONALLY BLANK

PRINTED IN ENGLAND



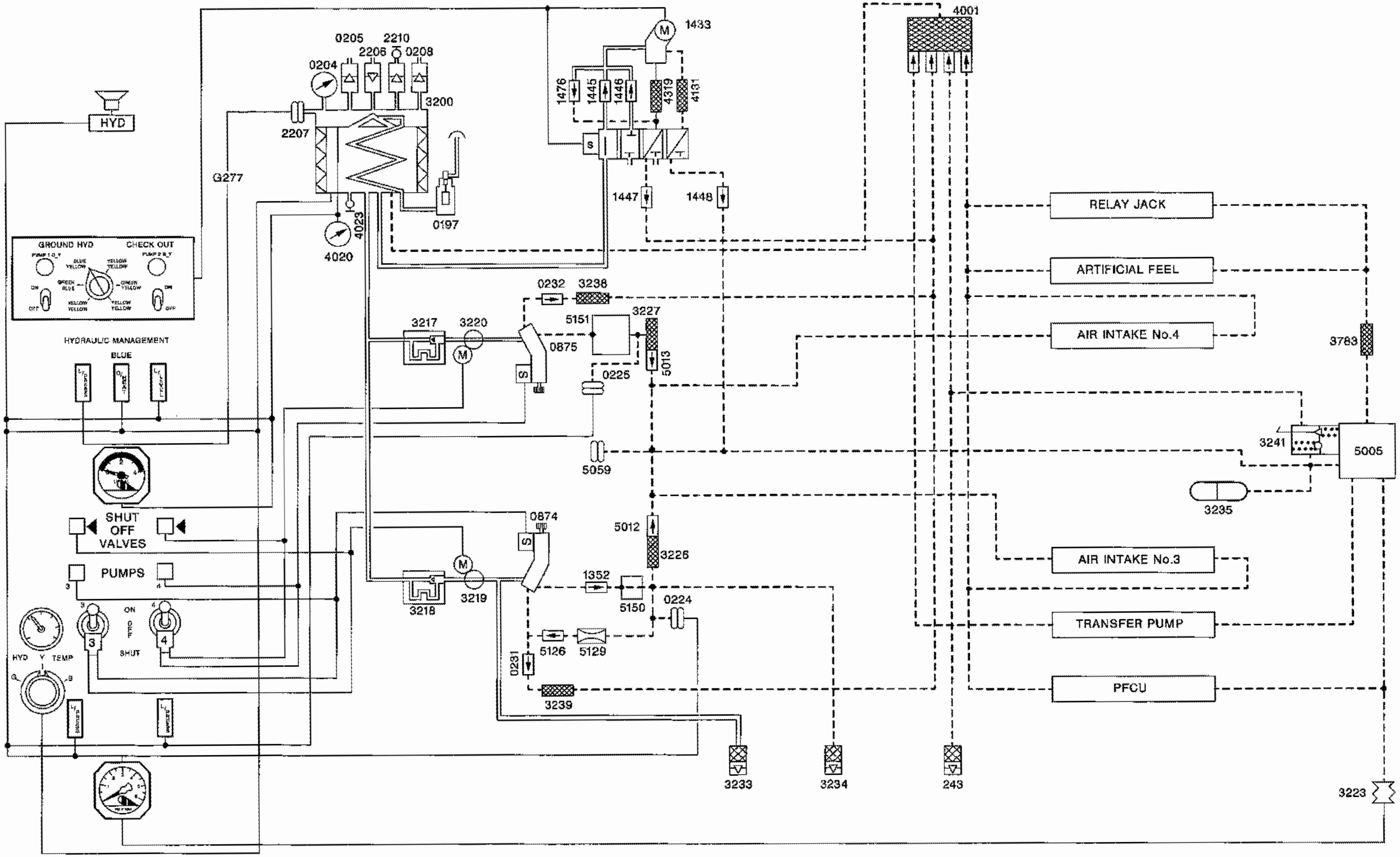
Blue System
Figure 001

PRINTED IN ENGLAND



Blue System
Figure 001A

PRINTED IN ENGLAND



Blue System
Figure 001B

Two case drain filters (3239) and (3238).
Tank return filter (3-micron) (4001).
Two system pressurization ground connectors (3233) and (3234).
Tank ground fitting connector (243).

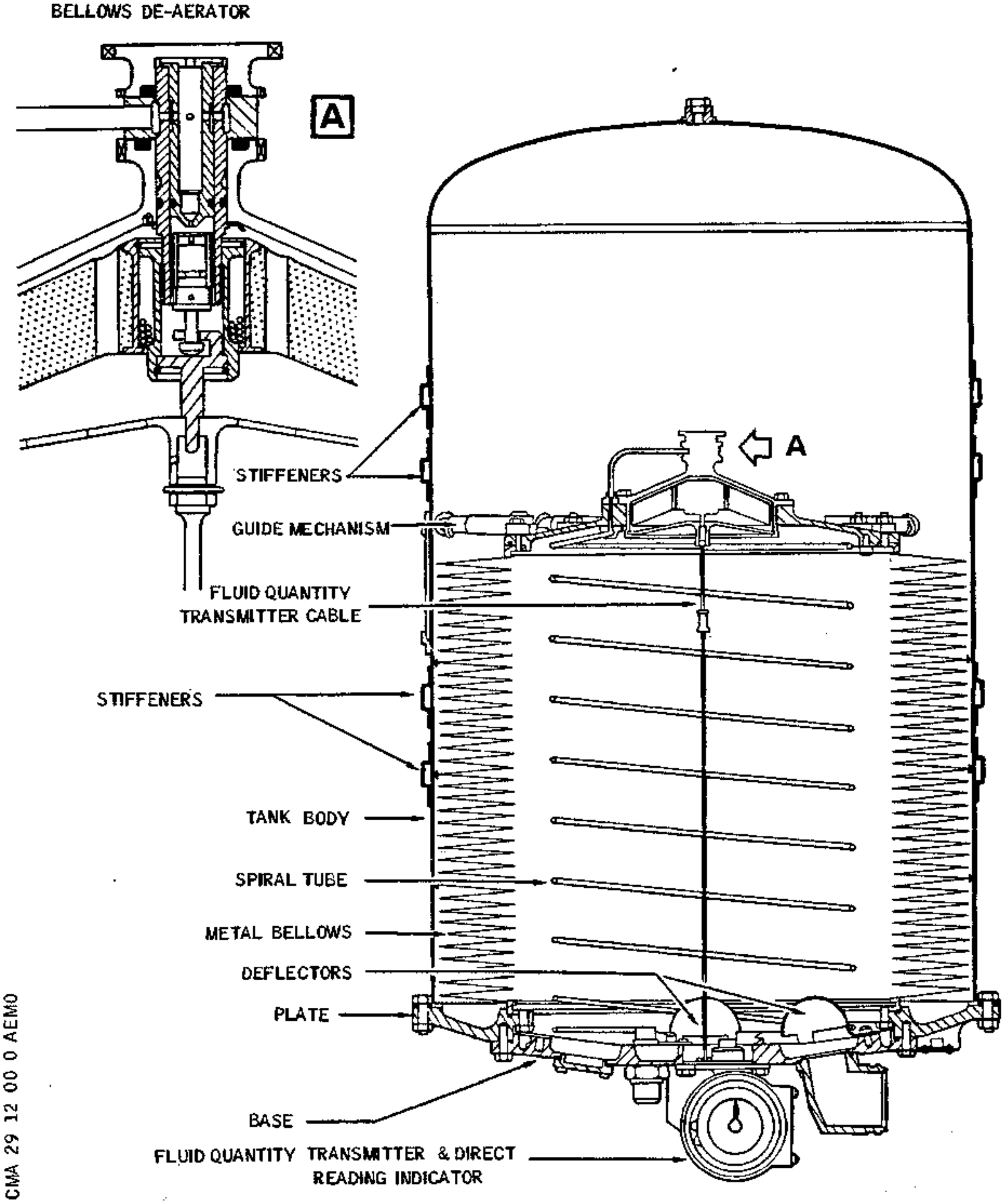
3. Tank Assembly
(Ref. Fig. 002)

The Blue hydraulic tank contains the fluid required by the pumps to provide the power necessary for operation of the various aircraft systems.

A. Leading Particulars

Maximum capacity : 4.1 US Gal (3.4 Imp Gal, 15.5 litres).
Normal fill level : 2.1 US Gal (1.75 Imp Gal, 8 litres).
Low level warning :1.2 US GAL (1 Imp Gal, 4.5 litres).

No account is taken of the amount of fluid contained in the bellows when compressed. The amount of fluid not indicated on the indicator is 0.9 US Gal (0.74 Imp Gal, 3.4 litres).



Blue Tank Assembly
Figure 002

B. Description (Ref. Fig. 003)
(1) The tank consists of :

(a) A cylindrical body strengthened by four external stiffeners, and closed at the top by a welded cover and at the base by a bolted plate supporting the bellows.

R (b) A metal bellows fitted with guides. The hydraulic fluid is contained inside the bellows, whilst pressurizing air acts on the outside.

(2) The following components are mounted on the tank :

R (a) A de-aerator connected to ambient by a spiral tube.

R (b) Fluid quantity transmitter (4020) with a direct reading indicator

R (c) Pressurization non-return valve (0205)

R (d) Direct reading air pressure indicator (0204)

R (e) Low pressure switch (2207) (air pressure)

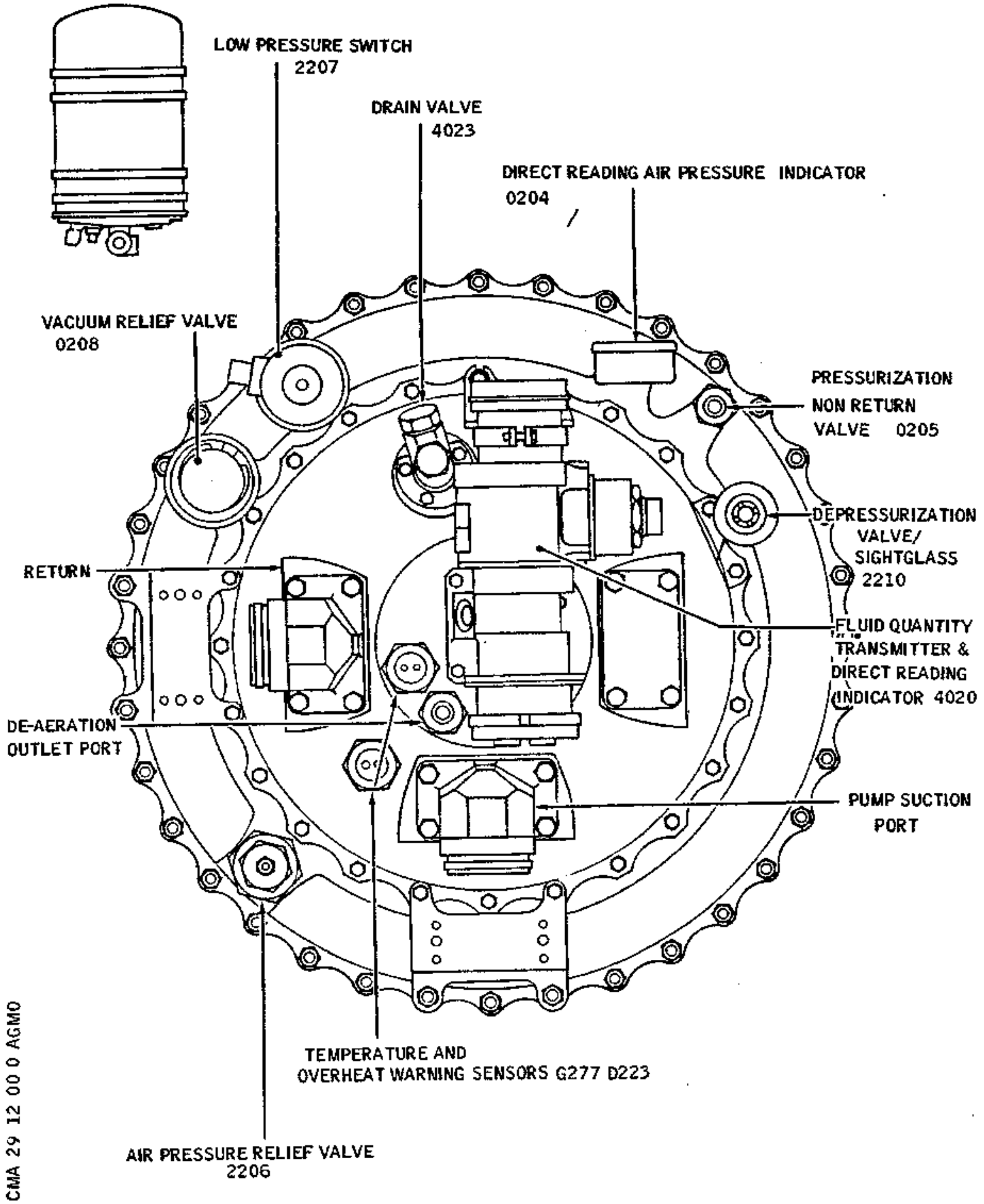
R (f) Air pressure relief valve (2206)

R (g) Vacuum relief valve (0208)

R (h) Depressurization valve/sightglass (2210)

R (i) Drain valve (4023)

R (j) Overheat warning sensor (G277).



Blue Tank Components
Figure 003

R (k) Temperature sensor (D223)

C. Operation

(1) Pressurizing air acts upon the outside of the bellows, which contains the hydraulic fluid.

As the air and fluid are separated, fluid contamination, emulsion or oxidation, is avoided.

(2) The tank is filled or topped up by means of a hydraulic ground unit connected into a tank return line by a quick-disconnect, self-sealing ground connector. The fluid is filtered before entering the bellows.

(3) A de-aerator mounted at the top of the bellows, and connected to the bottom of the tank, and then to a de-aerator safety valve, by a spiral tube, provides continuous evacuation through the tube of any air which may enter the bellows.

(4) A fluid quantity transmitter and direct reading indicator assembly allows :

(a) Direct reading of the quantity of fluid in the tank.

(b) Electrical transmission to the quantity indicator on the Flight Engineer's panel.

(c) Control of a microswitch which, when the minimum level is reached :

- Illuminates L/LEVEL warning light on the Flight Engineer's panel
- Illuminates HYD warning light on the master warning panel
- Triggers the aural warning gong
- Shuts off the normal hydraulic power supply to the two associated air intakes
- Automatically switches over the two air intakes to the Yellow auxiliary system.

(d) Discharge of any excess hydraulic fluid in the tank.

R (e) A cable connecting the internal mechanism of the quantity indicator to the top of the bellows transmits bellows movement to the indicator.

(5) Pressurizing air is admitted to the tank through a non-return valve.

(6) A low pressure switch calibrated to 29 ± 1.45 psi (2 ± 0.1 bars) controls the L/PRESS warning light on the Flight Engineer's panel.

(7) A pressure indicator gives a direct reading of tank air pressure.

(8) A pressure relief valve allows any excess air, which could create tank overpressure, to be vented to ambient.

(9) A vacuum relief valve opens when the pressure differential between the tank and outside pressure reaches 0.34 psi (23 mb).

(10) A depressurization valve and sightglass assembly permits :

- Drainage of condensation water
- Checking of the bellows for leakage by making certain that there is no fluid in the air compartment
- Depressurization of the tank by rotating the knurled control knob.

(11) The tank can be drained through a drain valve.

R
R (12) In the event of fluid overheat a temperature sensor illuminates the O/HEAT caption light on the Flight Engineer's panel and the HYD warning light on the master warning panel, and also triggers the warning gong.

R
R
R (13) A second temperature sensor transmits hydraulic fluid temperature information to the Flight Engineer's panel.

4. Heat Exchangers
(Ref. Fig. 004)

A. General

(1) During flight, heat is generated in the hydraulic system due to internal leakages. To maintain system fluid at an acceptable temperature, it is cooled in hydraulic fluid/fuel heat exchangers.

(2) As a safety precaution hydraulic fluid in the heat exchangers in kept at a higher pressure than the

fuel.

(3) A by-pass valve on the hydraulic fluid line side opens when :

- Fluid temperature is below 140° F (60° C).
- The flow rate exceeds 9.25 US Gal/min (7.7 Imp Gal/min, 35 litres/min).

(4) There are two types of heat exchanger :

(a) The type 4 single exchangers, mounted on engines 1 and 3.
(On engine 1 hydraulic pump suction line and fuel supply line).
(On engine 3 hydraulic pump suction line and fuel supply line).

(b) The type 3 double heat exchanger, formed by coupling two separate exchangers together, one connected to the main system, the other to the Yellow auxiliary system.
This type of exchanger is mounted on engines 2 and 4 hydraulic pump suction lines and fuel supply lines. Each of these engines drives two pumps one for the main and one for the auxiliary system.

B. Heat Exchanger Construction

(1) Single Heat Exchanger (Type 4) :

This consists of a Type 1 core assembly upon which is mounted at one end a molded housing containing the fuel and hydraulic fluid inlet and outlet ports, and at the other end a cap in AU4G which ensures the transfer of fuel inside and of hydraulic fluid outside, the core tubes.

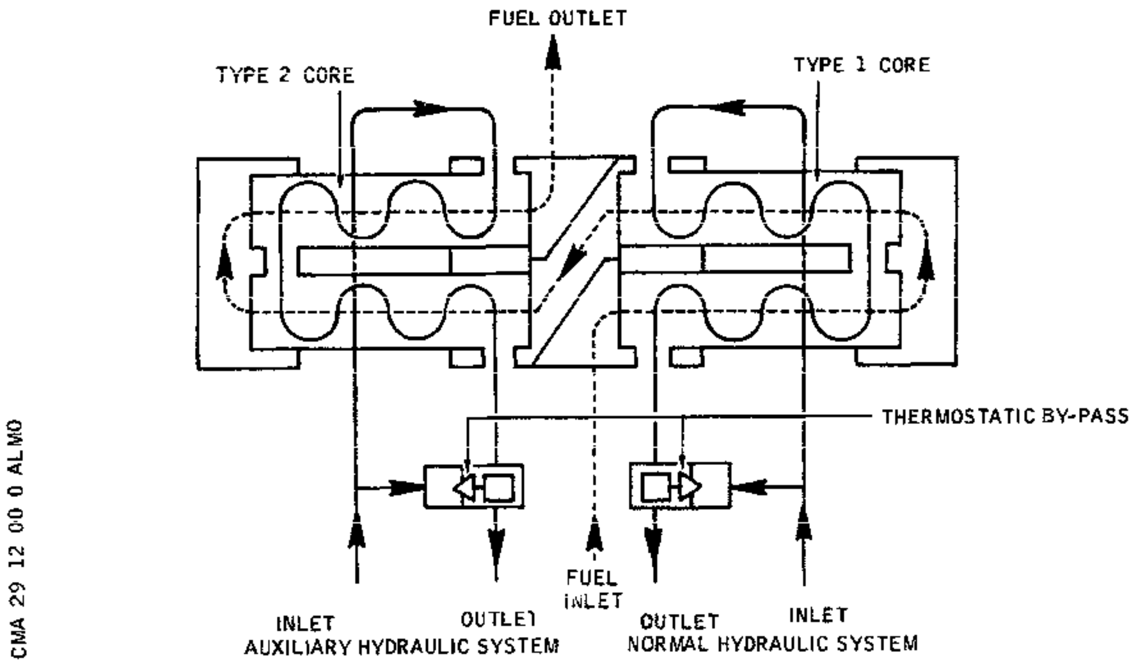
A by-pass fitted with a thermostatic valve with incorporated pressure relief valve, is mounted on the housing.

The core is made of two brazed light alloy tube assemblies.

(2) Double Heat Exchanger (Type 3) :

This consists of two individual heat exchangers composed of a Type 1 and a Type 2 core mounted on either side of a central molded support, containing the fuel inlet and outlet ports, as well as those of the nor-

mal and auxiliary hydraulic systems. It is designed so as to link the core tubes in series, thus providing a single fuel system across the two core assemblies.
The other end of each core bears a cap in AU4G for fuel and hydraulic fluid transfer from one tube assembly to the other of the same core.



Heat Exchanger (Type 3) Circulation Diagram
Figure 004

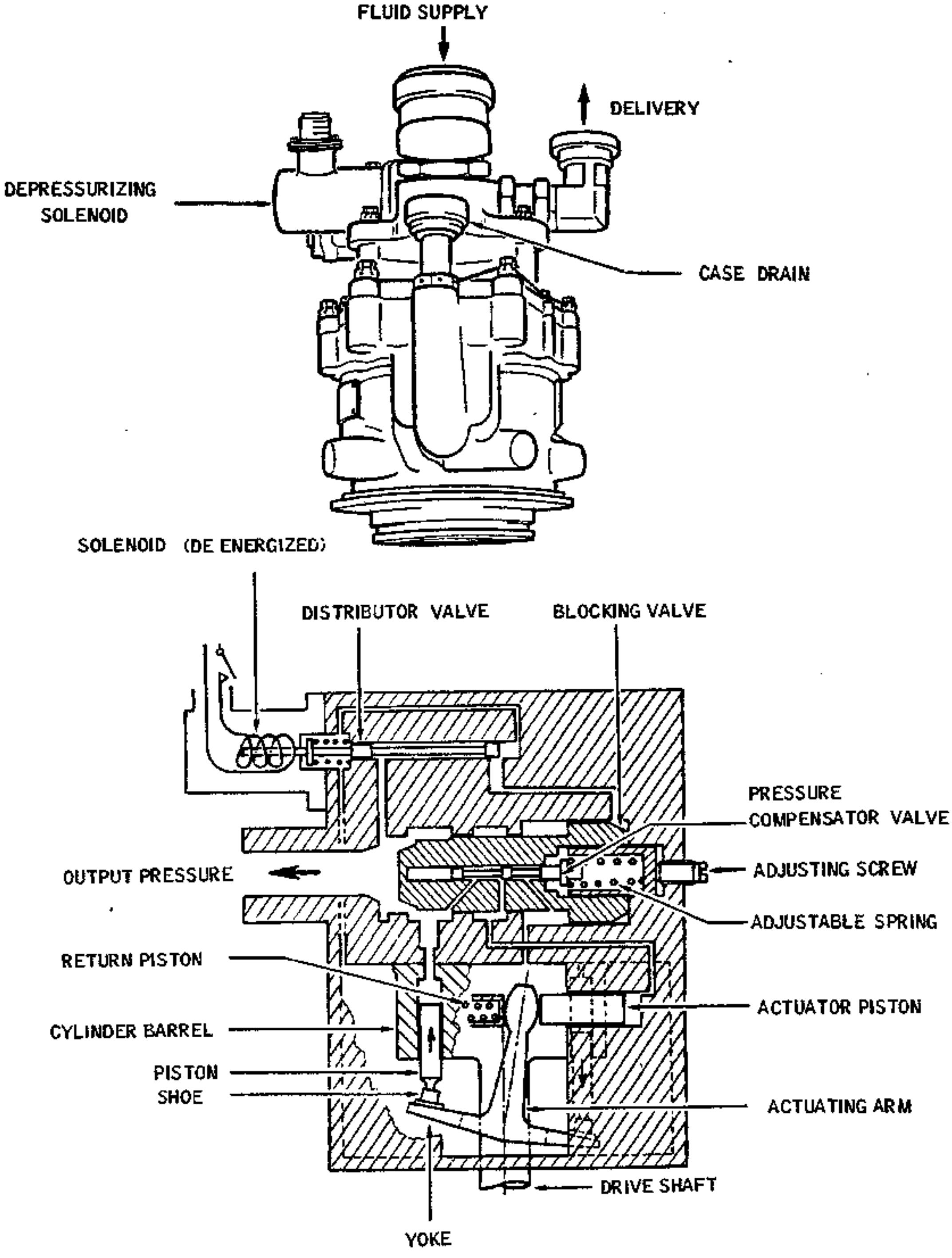
5. Pumps - Engine-Driven (Ref. Fig. 005)

A. Description

Each pump contains a rotating cylinder barrel, integral with the drive shaft. The barrel houses nine pistons bearing against a yoke by means of shoes which are balanced hydraulically by a thin film of fluid maintained between the shoes, admitting fluid from the system.§

B. Operation

The rotation of the barrel in relation to the yoke imparts



CMA 29 12 00 0 ANMO

Engine-Driven Hydraulic Pumps
Figure 005

a reciprocating movement to the pistons, which draw in and discharge hydraulic fluid. The tilt angle of the yoke is controlled by an arm driven in one direction by a servo-controlled actuator piston, and in the other by a return piston.

C. Regulation

Automatic regulation of delivery pressure is achieved by adapting flow to demand, while maintaining a pre-determined pressure of 4000 psi (275 bars).
Delivery pressure is applied to the slide of a pressure compensator valve, which is spring-loaded shut. The spring is adjustable. When delivery pressure exceeds the spring calibration the compensator valve slide is displaced and pressure is admitted to the actuator piston controlling the tilt angle of the yoke. The tilt angle is reduced, producing a consequent reduction in flow, and with the result that the required delivery pressure is maintained.
When delivery pressure is below spring calibration, the slide valve closes again and pressure is no longer applied to the actuator piston controlling the yoke angle.
The latter is then driven back into the "maximum stroke" position by the return piston.

D. Depressurization

When the depressurizing solenoid is energized, delivery pressure is directed to the blocking valve, which closes the pressure outlet to the delivery line. Movement of this valve creates a new balance in the pressure compensator valve it contains, admitting pressure to the yoke actuator piston and reducing pump output to zero.
There is no delivery into the system by the pump, but the
R slight pressure maintained inside it enables lubrication
R enables lubrication (return is via the case drain).

6. Filter Assy - Tank Return (Ref. Fig. 006)

The filter assembly, which is enclosed in a casing, filters return fluid from the various services and pump case drains.

An isolation valve in the filter enables the filter to be replaced without the tank having to be drained.

The main filter consists of 2 parts :

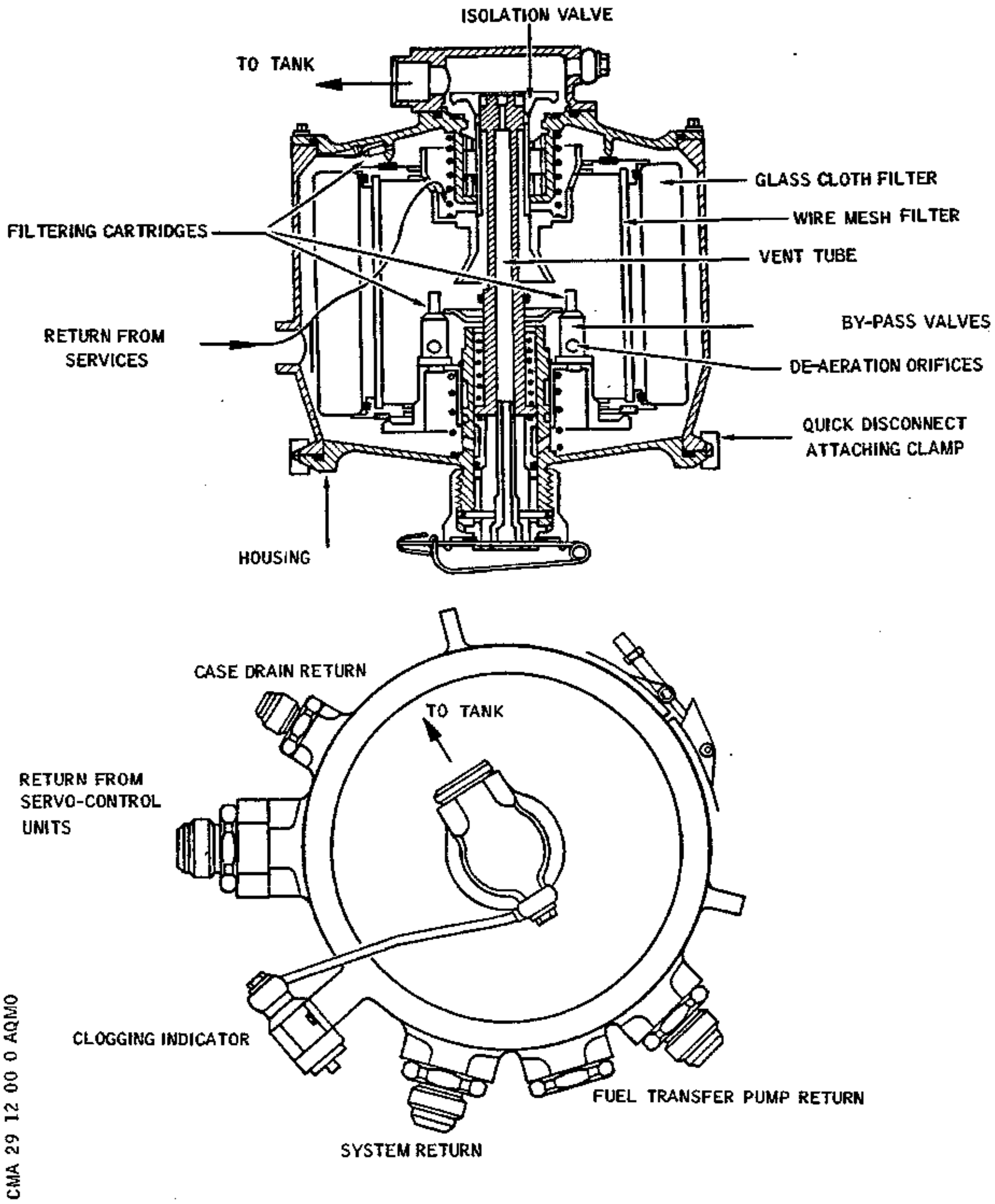
- An outer part of pleated glass cloth, protected by two perforated plates. The filtering capability of this element, which cannot be cleaned, is 3-microns absolute.
- An inner part of nickel-plated wire mesh, of 5 microns nomi-

nal, (25 microns absolute) filtering capability. This element can be cleaned.

In the event of accidental clogging the filtering element is protected by four by-pass valves, each of which is equipped with a 13-micron filter.

These valves open when the differential between inlet and outlet pressures reaches 13.05 psi (0.9 bars).

The four by-pass valve filters and the three filters on the cover, by-pass the main filter, enabling evacuation of any air which may accumulate in the filter housing.



CMA 29 12 00 0 AQMO

Tank Return Filter Assy : Schematic,
Normal Operation
Figure 006

7. Valve - Pressure Relief and Manual Unloading
(Ref. Fig. 007)

A. Description

In order to ensure smooth operation, the pressure relief valve is adjustable. It contains, in a single housing :

- A pilot slide valve assembly
- A distributor slide valve assembly.

The pilot slide valve assembly is an easily removable and replaceable adjustable cartridge.
Valve opening pressure is adjusted by means of an adjusting screw on the outside.

The distributor slide valve assembly consists of a sleeve in which moves a slide, controlled by a small actuating cylinder.

The unloading device is mounted at the end of the distributor slide valve.
It comprises :

- A housing attached to the pressure relief valve
- A plunger piston
- A cam attached to a spindle. A control lever is attached to the protruding end of the spindle.

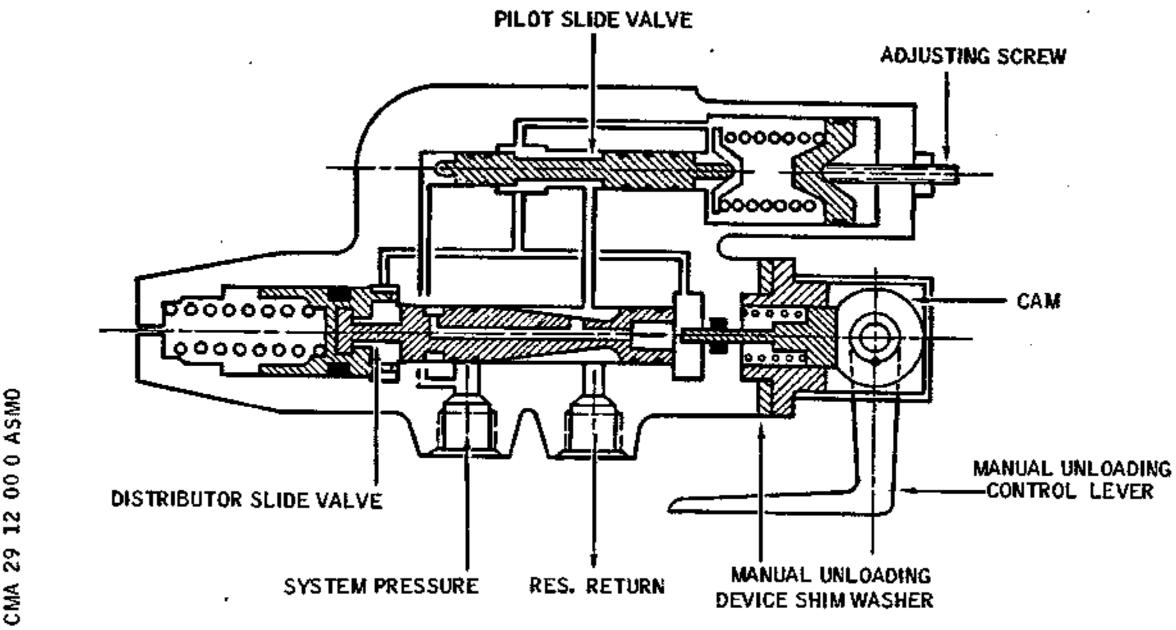
B. Operation (Ref. Fig. 007)

For system pressure between 0 and 4583 psi (0 to 316 bars) (opening pressure setting) the displacement of the pilot slide valve does not allow supply to the distributor slide valve actuating cylinder. The system, under pressure, is closed.

When a pressure of 4583 psi (316 bars) is reached, the connection to the distributor slide valve opens. However, in order to ensure smooth operation of the pressure relief valve, the pilot valve is designed as a pressure reducing valve. The servo pressure acting on the distributor slide valve actuating cylinder depends on the actuating cylinder spring calibration.

The system opens gradually by a relatively long piston stroke.

This design avoids any distributor slide valve vibration, and consequent uneven operation of the pressure relief val-



Pressure Relief and Manual Unloading Valve
Functional Diagram
Figure 007

ve.

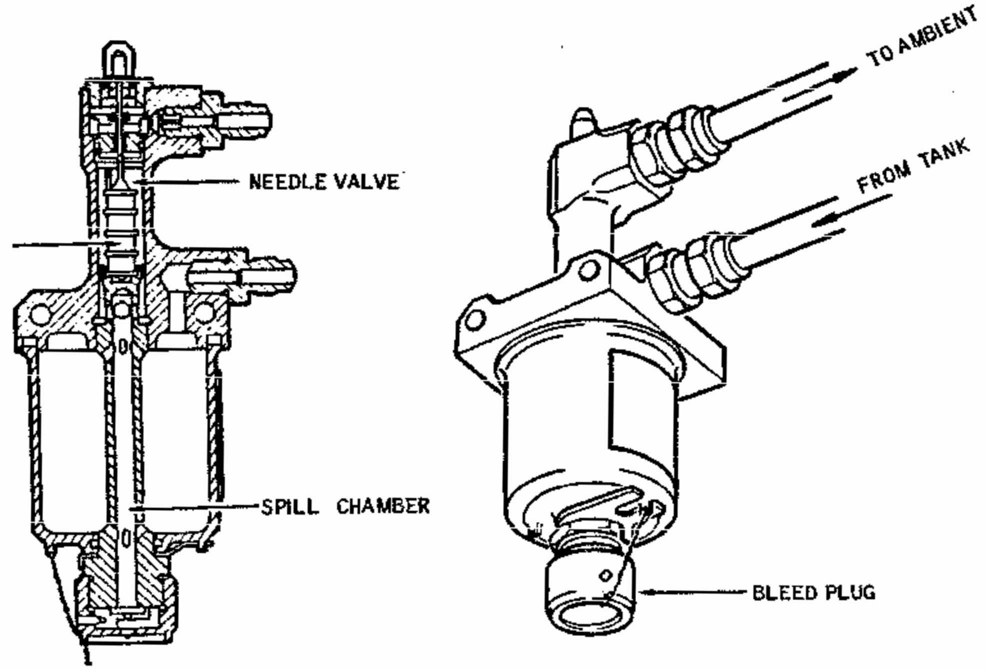
8. Valve - Tank De-Aerator Safety
(Ref. Fig. 008)

A. Description

The de-aerator safety valve connects the tank de-aeration outlet part to ambient thus enabling continuous de-aeration of the hydraulic fluid.
The valve consists of a housing with a bore at the top in which a float valve rises and falls.

B. Operation

In the event of failure of the tank de-aerator, hydraulic fluid fills the body of the valve and lifts the float. The needle valve on the end of the float closes the port. Beneath the float a spill chamber prevents the valve being closed by any globules of liquid.



PRINTED IN ENGLAND

CMA 29 12 00 0 AUMO

Tank De-Aerator Safety Valve
Figure 008

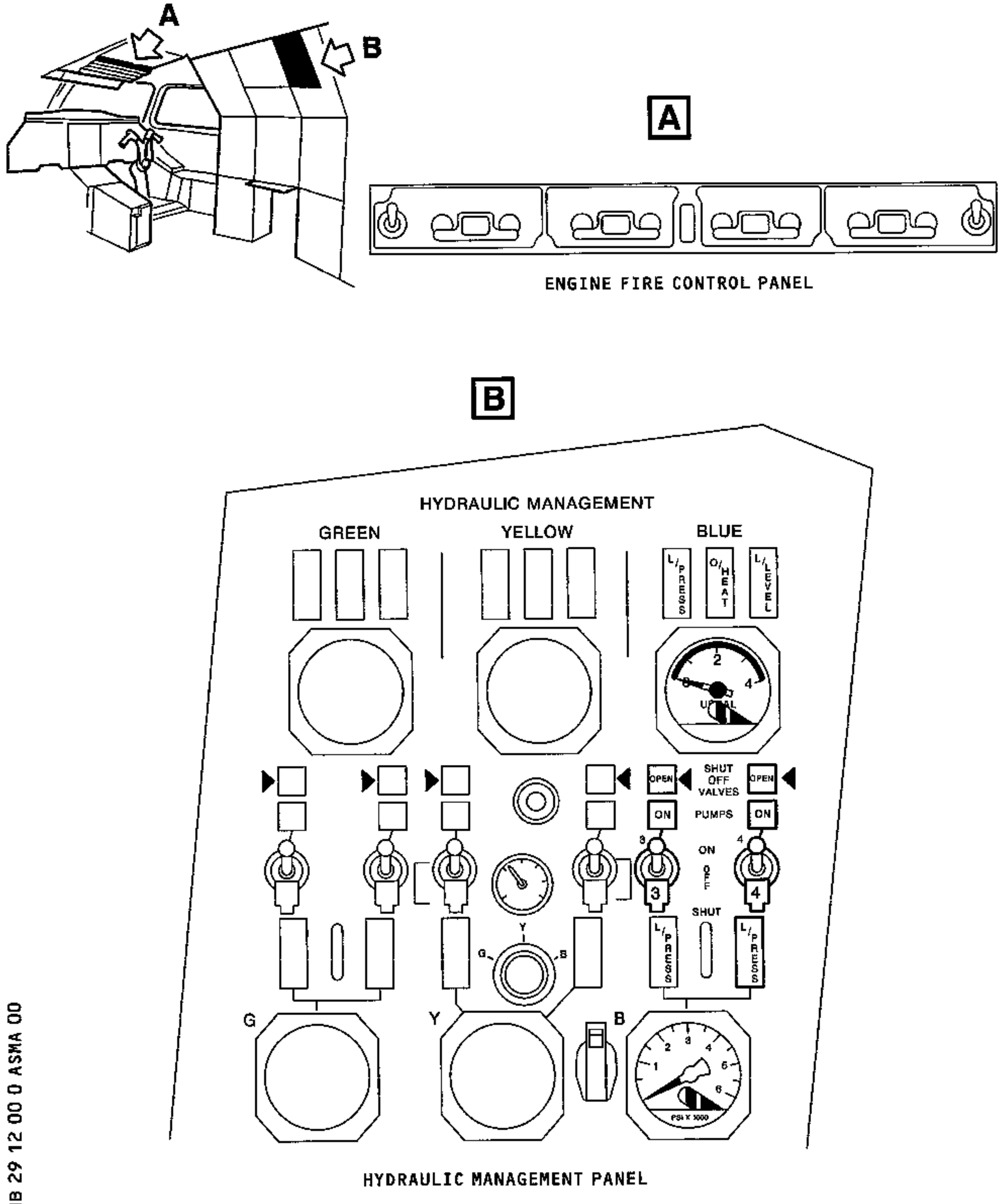
9. Operation
R ON A/C 001-006 (Ref. Fig. 009)
R ON A/C 007-007 (Ref. Fig. 009A)

A. The components composing the Blue system have the following functions.

(1) The hydraulic tank supplies fluid through heat exchangers and shut-off valves, to two self-regulating hydraulic pumps. These supply the various services with hydraulic fluid at 4000 psi (275 bars) pressure, via micronic filters and non-return valves.

(2) A free-moving piston-type hydraulic accumulator installed at the manifold absorbs pressure surges and provides the extra pressure required to compensate for pump response time when a substantial, instantaneous power supply is required for the services or servo-control units.

(3) The hydraulic tank is pressurized to 65 psi (4.5 bars) in order to avoid pump cavitation. Its maximum volume

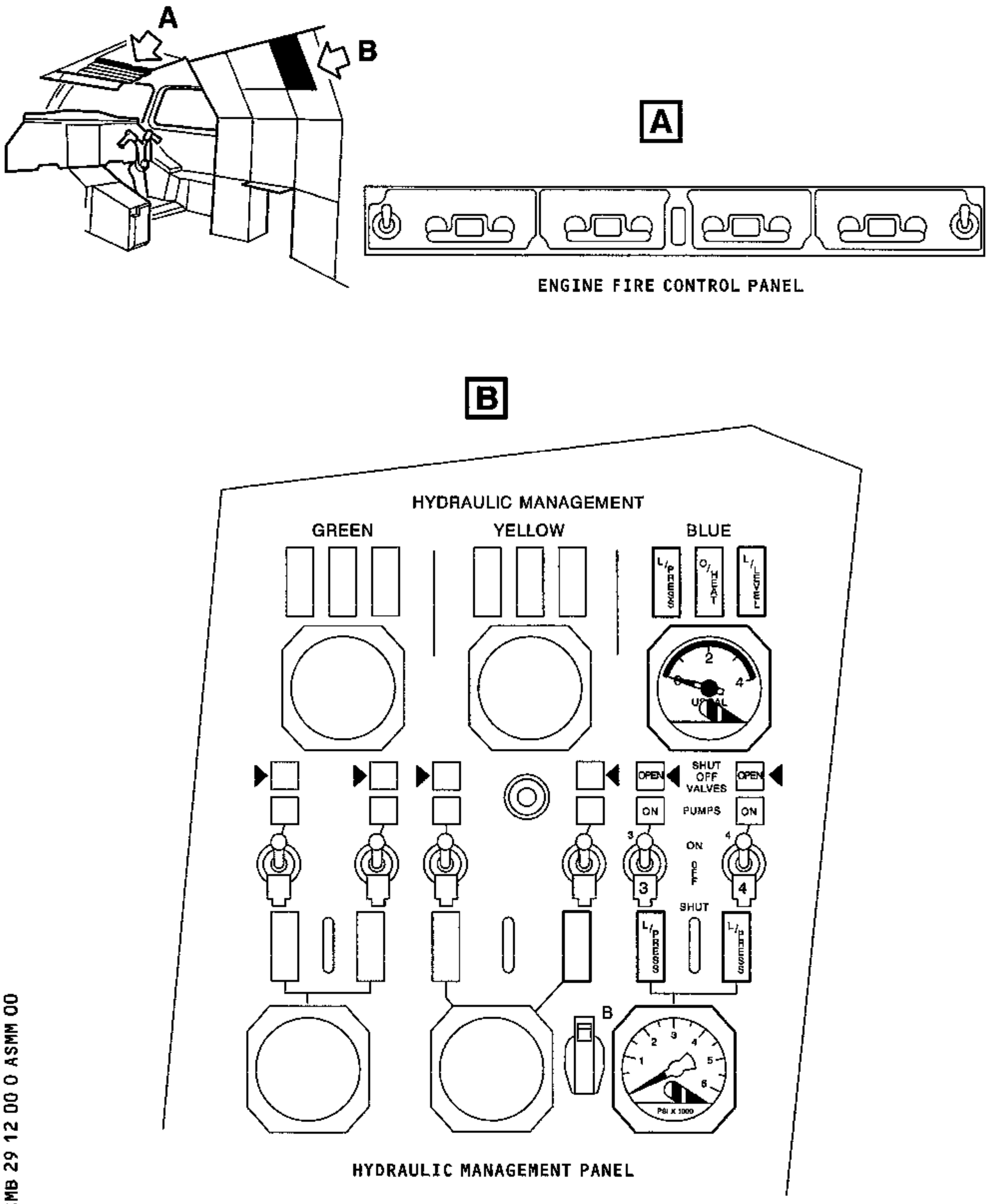


PRINTED IN ENGLAND

CMB 29 12 00 0 ASMA 00

Location of Hydraulic and Engine Fire Control Panels
Figure 009

PRINTED IN ENGLAND



CMB 29 12 00 0 ASMM 00

Location of Hydraulic and Engine Fire Control Panels
Figure 009A

PRINTED IN ENGLAND

INTENTIONALLY BLANK

is 4.1 US Gal (3.4 Imp Gal, 15.5 litres) and its normal fill quantity is 2.1 US Gal (1.75 Imp Gal, 8 litres). Any drop in pressurizing air pressure, any fluid over-heat or low level conditions are indicated on the Flight Engineer's HYDRAULIC MANAGEMENT panel by three warning lights.

(4) The hydraulic fluid/fuel heat exchangers incorporated in the suction line enable fluid temperature in the system to be kept at an acceptable level of 203 to 221° F (95 to 105°C). The exchangers operate when fluid temperature exceeds 140° F (60° C) or when pump output is less than 9.25 US Gal/min (7.7 Imp Gal/min, 35 l/min).

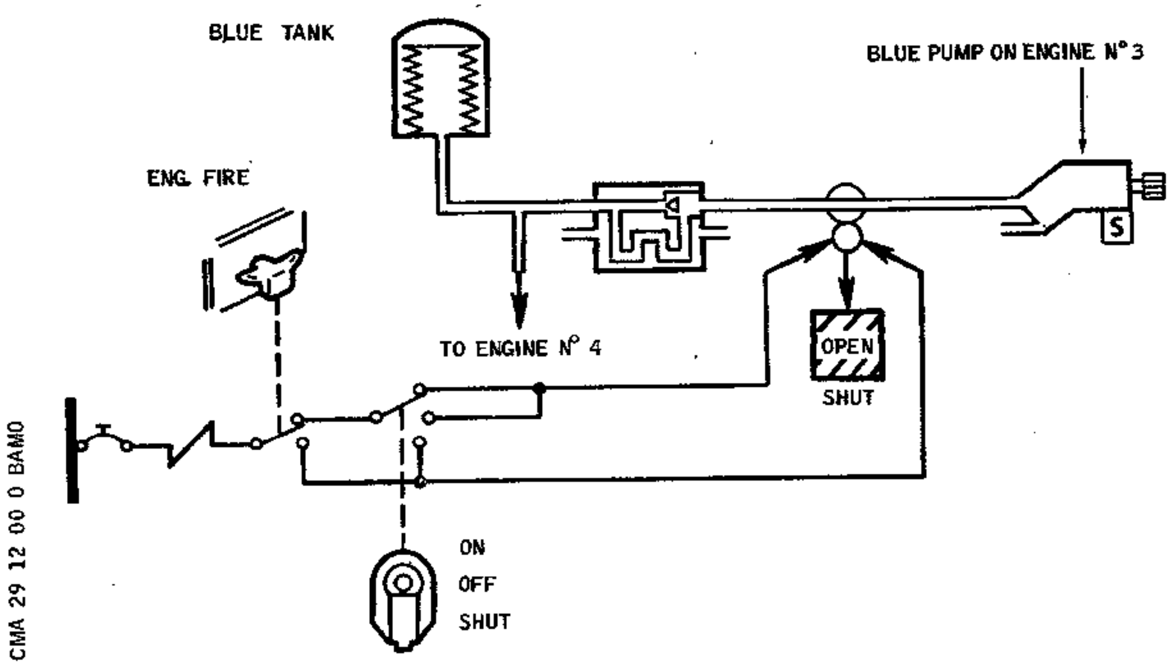
(5) In the event of an engine fire, shut-off valves on the suction line, located in the wing outside the na-celle, cut off hydraulic fluid supply. Each valve is operated by an electric motor controlled by a 3-position ON, OFF, SHUT switch on the Flight Engineer's panel :

ON, OFF position : shut-off valve open.
SHUT position : shut-off valve closed.

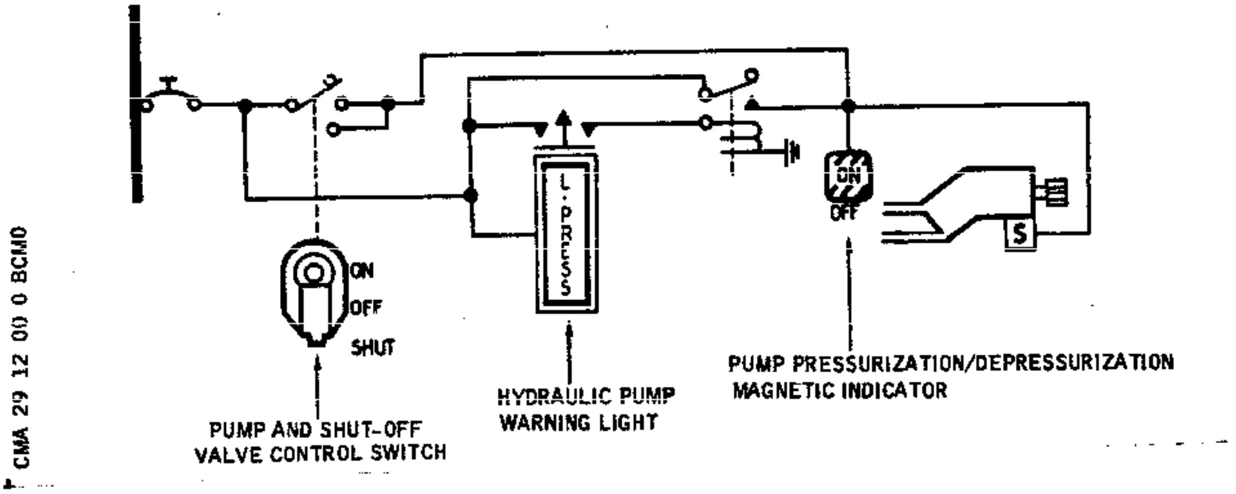
The SHUT position can only be obtained after the sealed guard on the switch has been raised.
In the event of an engine fire, actuation of the rele-vant ENG FIRE handle causes the shut-off valves to close. A magnetic indicator on the Flight Engineer's panel shows the position of the shut-off valve (OPEN or SHUT).
During valve transit, the de-energized indicator is cross-hatched.
(Ref. Fig. 010)

(6) The two self-regulating pumps driven by engines 1 and 2 accessory gearboxes supply a pressure of 4000 psi (275 bars) and can provide a nominal delivery of 34.34 US Gal/min (28.60 Imp Gal/min, 130 l/min). Circulation of recuperated return leakage ensures cooling and lu-brication of the pump.

Each pump has a solenoid-controlled depressurizing system. The solenoid is energized by the three-position ON, OFF, SHUT switch mounted on the Flight Engineer's panel :
(Ref. Fig. 011)



Shut-Off Valve Control and Indication
Figure 010



Control and Indication of Blue System Pumps
Figure 011

- In ON position the solenoid is not energized, and the pump is pressurized.
- In OFF or SHUT position the solenoid is energized and the pump depressurized.

A magnetic indicator on the Flight Engineer's panel indicates whether the pump is pressurized or depressurized (it displays ON or OFF respectively).

(7) The suction, delivery and case drain hoses are composed of two concentric reinforced pipes. The hydraulic fluid normally flows through the inner pipe. In the event of leakage, it passes into the outer pipe.

A mechanical check device fitted on the hose connection enables the condition of the inner pipe to be checked.

On the pump HP delivery hose any fluid leakage in the inner pipe is drained off into the pump suction line.

After SB 29-045-02 For A/C 001-007,

(7) Not applicable.

R ON A/C 001-005

R After SB 29-041 For A/C 001-005

R (7) Pulse dampers installed on hydraulic pump delivery
R lines reduce pressure surges in magnitude.

(8) A pressure switch preset to 2030.5 psi (140 bars) is mounted in parallel with the delivery line of each pump to indicate any pump failure.

(9) A non-return valve prevents any back pressure on the pump should the engine or the pump itself shut down It also maintains the pressure of the other pump in the system.

(10) Delivery pressure signals are transmitted to an indicator on the Flight Engineer's panel by a pressure transmitter mounted in parallel with the servo-control selector supply line.

(11) A pressure relief and manual unloading valve preset to 4583 psi (316 bars), and mounted on the manifold, protects the system from excess pressure due to thermal expansion of the fluid, or to a malfunction of the pump regulation system.

The manually actuated unloading device enables the hydraulic system to be depressurized during ground maintenance or troubleshooting work.

(12) All services and pump case drain returns to the tank pass through non-return valves and a 3-micron filter.

(13) A valve fitted on each LP and HP filter allows the filter element to be removed without the tank having to be drained.

(14) The system is self-bleeding and no special bleeding procedure is required when equipment is changed. Pressurization of the system and a component functional test are sufficient to eliminate any air.

(15) The tank is filled on the ground through a ground connector and an LP filter.

(16) Two ground connectors incorporating self-sealing valves enable system pressurization and testing to be carried out using ground power units.

(17) Self-sealing valves enable rapid disconnection of the hydraulic lines during removal of an engine.

10. Electrical Power Supply

Power is supplied to the control and indicating circuits by the essential busbars.
The busbars, and the panels on which they are located, are listed in the following chart :

SERVICE	BUSBAR			C/B PANEL
ENG3 SHUT-OFF VALVES CONT	No.4 ESSENTIAL	115 VAC	8X	2-213
ENG4 SHUT-OFF VALVES CONT	No.3 ESSENTIAL	115 VAC	7X	2-213
BLUE TANK CONTENTS IND	A MAIN	26 VAC	12X	13-215
HYD PUMP CONTROL	A MAIN	28 VDC	1P	15-215
SHUT-OFF VALVES IND	B MAIN	28 VDC	2P	15-216
BLUE GRN L.L., L.P., O/HEAT IND	B MAIN	28 VDC	2P	15-216
**ON A/C ALL				
HYD FLUID TEMP IND	A MAIN	28 VDC	1P	15-215

Printed in England

BLUE SYSTEM - TROUBLE SHOOTING

WARNING : MAKE CERTAIN THAT THE POSITIONS OF NOSE AND MAIN GEAR DOORS CORRESPOND WITH THE ACTUAL POSITIONS OF THE RESPECTIVE OPERATING HANDLES.
HANDLE LOCKED, INDICATOR PLATE SHOWING WHITE : DOORS CLOSED.
HANDLE LOCKED, INDICATOR PLATE SHOWING RED : DOORS OPEN.

MAKE CERTAIN THAT THE LANDING GEAR POSITION INDICATED ON THE GEARS POSITION INDICATING UNIT CORRESPONDS WITH THE ACTUAL POSITION OF THE LANDING GEAR.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE, MAKE CERTAIN THAT THE TRAVEL RANGES OF THE CONTROL SURFACES ARE CLEAR.

BEFORE PRESSURIZING HYDRAULIC SYSTEMS, CHECK THAT ALL CONTROLS ARE SET TO CORRESPOND WITH THE ACTUAL POSITION OF THE SERVICES THEY OPERATE.

MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

OBSERVE THE ELECTRICAL SAFETY PRECAUTIONS DESCRIBED IN CHAPTER 24-00-00 SERVICING.

1. General

In order to obtain rapid trouble shooting of hydraulic systems, fault analysis is divided in two parts :

- Trouble shooting with the engines shut down.
- Trouble shooting with the engines operating.

Procedure described below deals only with pumps 3 system ; for pumps 4 system transpose indications in parentheses.
The defect can be isolated with the aid of the trouble shooting procedures and traced through OK and NOT OK paths to the appropriate charts or other specified rectification action as may be necessary. If a defect occurs perform the appropriate rectification action, then repeat the operation at which the defect was encountered to ensure the operation is OK.
Bracketed numbers in the procedures and charts indicate items on the component identification table (Ref. table 101).
The table provides information, including component location, required for rectification.
All procedures dealing with trouble shooting are based on the assumption that electrical wiring is serviceable, all associated circuit breakers are set and electrical power is available,

unless otherwise stated. If the fault is not rectified check the wiring in accordance with the Wiring Diagram Manual (Ref. table 101).

2. Prepare

A. Equipment and Materials

DESCRIPTION	PART NO.
Electrical Ground Power Unit	

B. Check that the following circuit breakers are set :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
ENG 1 SHUT-OFF VALVES CONT	2-213	W 3	F15
GRN SYS PRESS IND		1D 21	C15
BLUE SYS PRESS IND		3D 21	D15
ENG 2 SHUT-OFF VALVES CONT		W 7	B15
ENG 4 SHUT-OFF VALVES CONT	4-213	W 8	C10
ENG 3 SHUT-OFF VALVES CONT		W 4	D10
YELL SYS PRESS IND		2D 21	E10
GRN TANK CONTENTS IND	13-215	D 41	E 8
BLUE TANK CONTENTS IND		D 43	F 8
HYD TANK AIR COMP SUP		M 601	G 7
YELL TANK CONTENTS IND	13-216	D 42	B12
HYD GRND CHECK OUT PUMP CONT	14-216	M 626	A16
ENG 2 YELL PUMP CONT IND	15-215	M 311	B 8
ENG 4 YELL PUMP CONT IND		M 312	B 9
YELL LL.LP O/HEAT IND		G 261	C 9
ENG 1 GRN PUMP CONT IND		M 271	D 6
ENG 2 GRN PUMP CONT IND		M 272	D 7
HYD TANKS COMPR CONT		M 602	D 8
YELL PUMPS AUTO ON LOAD CONT		M 341	E 6
ENG 3 BLUE PUMP CONT IND		M 342	E 7

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
ENG 4 BLUE PUMP CONT IND		M 343	E 8
ENG 1 AND 2 SHUT-OFF VALVES IND	15-216	W 5	C18
ENG 3 AND 4 SHUT-OFF VALVES IND		W 6	C19
BLUE LL.LP O/HEAT IND		G 262	D19
GRN LL.LP O/HEAT IND		G 263	D20
HYD GRND CHECK OUT SEL VALVE CONT		M 626	F22

C. Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing).

D. On Flight Engineer's HYDRAULIC MANAGEMENT panel check that ON OFF SHUT control switches are in the following positions.

Switch ON OFF SHUT - GREEN in ON position
Switch ON OFF SHUT - BLUE in ON position
Switch ON OFF SHUT - YELLOW in AUTO position

Printed in England

E. On master warning panel check that :

```
**************************************
* HYD warning light is illuminated.  *
* If,                                *
**************************************------------------------------
        ||              |            | Ref. 29-11-00                |
        OK              NOT OK-------|      29-12-00                |
        ||                           |      29-21-00                |
        ||                           | Trouble Shooting             |
        ||                           ------------------------------
        ||
```

F. On Flight Engineer's HYDRAULIC MANAGEMENT panel, check that:

```
**************************************
* Tank L/PRESS caption lights are off*
* If,                                *
**************************************
        ||              |            ------------------------------
        OK              NOT OK-------| Ref. 29-31-00 Trouble       |
        ||                           | Shooting                    |
        ||                           ------------------------------
**************************************
* O/HEAT caption lights are off. If, *
**************************************
        ||              |            ------------------------------
        OK              NOT OK-------| Ref. 29-33-00 Trouble       |
        ||                           | Shooting                    |
        ||                           ------------------------------
**************************************
* L/LEVEL caption lights are off. If *
**************************************
        ||              |            ------------------------------
        OK              NOT OK-------| Ref. 29-32-00 Trouble       |
        ||                           | Shooting                    |
        ||                           ------------------------------
        ||
**************************************
* Transmitters indicate a normal     *
* level. If                          *
**************************************
        ||              |
        ||              |            ------------------------------
        ||              NOT OK-------| Ref. 29-32-00 Trouble       |
        ||                           | Shooting                    |
        OK                           ------------------------------
        ||
        ||
```

```
*************************************
* SHUT OFF VALVES magnetic indicators*
* display OPEN. If,                 *
*************************************
       ||            |
       OK            NOT OK----------|
       ||                            |
*************************************|
* Green and Blue systems PUMPS      *|
* magnetic indicators display ON and *|
* Yellow system PUMPS magnetic      *|
* indicators display OFF. If,       *|
*************************************|
       ||            |               |
       OK            NOT OK----------|
       ||                            |
*************************************|
* Pumps L/PRESS caption lights are  *|
* illuminated. If,                  *|
*************************************|
       ||            |               |
       OK            NOT OK----------|
       ||                            |
*************************************|
* On pressure indicators, warning   *|
* flags are not visible. If,        *|
*************************************|
                     |               |  ----------------------
                     |               | | Ref. 29-11-00        |
                     |               | |      29-12-00        |
                     NOT OK------------|      29-21-00        |
                                       | Trouble Shooting     |
                                        ----------------------
```

3. Trouble Shooting (Engines Shut Down)

```
****************************************************
* On master warning panel HYD warning light is     *
* illuminated. If,                                 *
****************************************************
     ||        |  ----------------------------------------
     OK    NOT OK--| HYD warning light is not illuminated.  |
     ||            | Ref. chart 101.                        |
     ||           ----------------------------------------
****************************************************
* On Flight Engineer's HYDRAULIC MANAGEMENT panel  *
* SHUT OFF VALVE 3 (4) BLUE magnetic indicator     *
* displays OPEN. If,                               *
****************************************************
     ||        |  ----------------------------------------
     ||        |  | SHUT OFF VALVE 3 (4) BLUE magnetic indicators |
     ||    NOT OK--| are cross hatched.                    |
     ||        |  | Check circuit breaker W6 [15].         |
     OK        |  ----------------------------------------
     ||        |  ----------------------------------------
     ||        |  | SHUT OFF VALVE 3 (4) BLUE magnetic indicator is|
     ||    NOT OK--| cross hatched.                        |
     ||           | Ref. chart 102.                        |
     ||           ----------------------------------------
****************************************************
* On HYDRAULIC MANAGEMENT panel PUMPS 3 (4) BLUE   *
* magnetic indicator display ON. If                *
****************************************************
     ||        |  ----------------------------------------
     OK    NOT OK--| PUMPS 3 (4) blue magnetic indicator displays |
     ||            | OFF.                                   |
     ||            | Ref. chart 103.                        |
     ||           ----------------------------------------
****************************************************
* On HYDRAULIC MANAGEMENT panel pump 3 (4) L/PRESS *
* caption light is illuminated. If,                *
****************************************************
     ||        |  ----------------------------------------
     OK    NOT OK--| Pump 3 (4) L/PRESS caption light is offf. |
     ||            | Ref. chart 104.                        |
     ||           ----------------------------------------
     ||
     ||
```

```
*****************************************************
* On HYDRAULIC MANAGEMENT panel, on pressure        *
* indicator, warning flag is not visible. If,       *
*****************************************************
    ||        |  ----------------------------------------------------
    OK     NOT OK--| Warning flag is visible on pressure indicator   |
    ||             | Ref. chart 105.                                  |
    ||           ----------------------------------------------------
*****************************************************
* On HYDRAULIC MANAGEMENT panel press pump 3 (4)    *
* L/PRESS caption light.                            *
* PUMPS 3 (4) magnetic indicator displays OFF. If,  *
*****************************************************
    ||        |  ----------------------------------------------------
    OK     NOT OK--| PUMPS 3 (4) magnetic indicator still displays   |
    ||             | ON.                                              |
    ||             | Ref. chart 106.                                  |
    ||           ----------------------------------------------------
*****************************************************
* On HYDRAULIC MANAGEMENT panel place control switch*
* 3 (4) in OFF position. PUMPS 3 (4) magnetic       *
* indicator displays OFF. If,                       *
*****************************************************
    ||        |  ----------------------------------------------------
    OK     NOT OK--| PUMPS 3 (4) magnetic indicator still displays   |
    ||             | ON.                                              |
    ||             | Ref. chart 107.                                  |
    ||           ----------------------------------------------------
*****************************************************
* On HYDRAULIC MANAGEMENT panel place control switch*
* 3 (4) in SHUT position. SHUT OFF VALVE 3 (4)      *
* magnetic indicator is cross hatched then displays *
* SHUT. If,                                         *
*****************************************************
    ||        |  ----------------------------------------------------
    ||        |    | SHUT OFF VALVE 3 (4) magnetic indicator is      |
    ||     NOT OK--| still cross hatched.                             |
    ||        |    | Ref. chart 108.                                  |
    ||        |  ----------------------------------------------------
    ||        |  ----------------------------------------------------
    ||        |    | SHUT OFF VALVE 3 (4) magnetic indicator still   |
    ||     NOT OK--| displays OPEN.                                   |
    ||             | Ref. chart 109.                                  |
    ||           ----------------------------------------------------
    OK
    ||
    ||
```

```
*****************************************************
* On HYDRAULIC MANAGEMENT panel place control switch*
* 3 (4) in ON position. SHUT OFF VALVE 3 (4)        *
* magnetic indicator is cross hatched then displays *
* OPEN. If,                                          *
*****************************************************
     ||       |     ------------------------------------------------
     ||       |    | SHUT OFF VALVE 3 (4) magnetic indicator is     |
     ||   NOT OK--| still cross hatched.                             |
     ||       |    | Ref. chart 110.                                 |
     OK       |     ------------------------------------------------
     ||       |     ------------------------------------------------
     ||       |    | SHUT OFF VALVE 3 (4) magnetic indicator still  |
     ||   NOT OK--| displays SHUT.                                   |
     ||            | Ref. chart 111.                                 |
     ||             ------------------------------------------------
*****************************************************
* On ENGINE FIRE CONTROLS overhead panel pull engine*
* 3 (4) shut down handle.                           *
* On HYDRAULIC MANAGEMENT panel SHUT OFF VALVE 3 (4)*
* magnetic indicator displays SHUT. If,             *
*****************************************************
     ||       |     ------------------------------------------------
     ||       |    | SHUT OFF VALVE 3 (4) magnetic indicator still  |
     OK   NOT OK--| displays OPEN.                                   |
     ||            | Replace engine shut down handle 3W160 [16]      |
     ||            | (4W160 [17]).                                   |
     ||             ------------------------------------------------
*****************************************************
* On overhead panel push ENGINE 3 (4) shut down     *
* handle.                                           *
* On HYDRAULIC MANAGEMENT panel SHUT OFF VALVE 3 (4)*
* magnetic indicator changes to OPEN. If,           *
*****************************************************
     ||       |     ------------------------------------------------
     ||       |    | SHUT OFF VALVE 3 (4) magnetic indicator        |
     OK   NOT OK--| displays SHUT. Replace engine shut down handle  |
     ||            | 3W160 [16] 4W160 [17].                          |
     ||             ------------------------------------------------
*****************************************************
* Pressurize hydraulic system through ground        *
* pressurizing system (Ref. 29-12-00, Servicing).   *
* On HYDRAULIC MANAGEMENT panel hydraulic system    *
* pressure reading is normal. if,                   *
*****************************************************
     ||       |     ------------------------------------------------
     OK   NOT OK--| Hydraulic system pressure is not correct        |
     ||            | Ref. chart 112.                                 |
     ||             ------------------------------------------------
     ||
```

4. Trouble Shooting (Engines Operating)

```
*****************************************************
* On HYDRAULIC MANAGEMENT panel pumps 3 (4) L/PRESS *
* caption light are off. If,                        *
*****************************************************
    ||      |    -----------------------------------------------
    OK    NOT OK--| Pump 3 (4) L/PRESS caption light is illuminated|
    ||           | Ref. chart 113.                                |
    ||           -----------------------------------------------
*****************************************************
* On HYDRAULIC MANAGEMENT panel system pressure read*
* on indicator is normal. If,                       *
*****************************************************
    ||      |    -----------------------------------------------
    ||      |    | System pressure read on indicator is abnormally|
    OK    NOT OK--| high.                                          |
    ||           | Ref. chart 114.                                |
    ||           -----------------------------------------------
*****************************************************
* On HYDRAULIC MANAGEMENT panel place pump 3 control*
* switch in OFF position.                           *
* On this panel L/PRESS 3 caption light comes on    *
* and on master warning panel HYD warning light     *
* comes on. If,                                     *
*****************************************************
    ||      |    -----------------------------------------------
    ||      |    | L/PRESS 3 caption light and HYD warning light  |
    ||    NOT OK--| do not come on.                                |
    ||      |    | Ref. chart 115.                                |
    ||      |    -----------------------------------------------
    OK      |    -----------------------------------------------
    ||      |    | L/PRESS 3 caption light comes on and HYD       |
    ||    NOT OK--| warning light does not come on.                |
    ||           | Ref. 33-15-00, Trouble Shooting.               |
    ||           -----------------------------------------------
    ||
    ||
```

```
*****************************************************
* On HYDRAULIC MANAGEMENT panel place pump 3 control*
* switch in ON position and pump 4 switch in OFF    *
* position.                                         *
* On this panel L/PRESS 4 caption light comes on and*
* on master warning panel HYD warning light comes on*
* If,                                               *
*****************************************************
    ||         |    ------------------------------------------------
    ||         |   | L/PRESS 4 caption light and HYD warning light  |
    ||     NOT OK--| do not come on.                                |
    ||         |   | Ref. chart 116.                                |
    ||         |    ------------------------------------------------
    OK         |    ------------------------------------------------
    ||         |   | L/PRESS 4 caption light comes on and HYD       |
    ||     NOT OK--| warning light does not come on.                |
    ||             | Ref. 33-15-00, Trouble Shooting.               |
    ||              ------------------------------------------------
*****************************************************
* On HYDRAULIC MANAGEMENT panel place pump 4 switch *
* in ON position. Test is conclusive, Blue hydraulic*
* system is operational.                            *
*****************************************************
```

```
**************************************
* HYD WARNING LIGHT IS NOT ILLUMINA- *
* TED.                               *
**************************************


**************************************
* On HYDRAULIC MANAGEMENT panel press*
* one O/HEAT caption light.          *
* HYD warning light comes on. If     *
**************************************
        |              |              ------------------------------
        |              |             | HYD warning light does not |
        |              |             | come on (on master warning |
       OK             NOT OK---------| panel).                    |
        |                            | Ref. 33-15-00, Trouble     |
        |                            | Shooting                   |
**************************************------------------------------
* Release O/HEAT caption light :     *
* HYD warning light goes off.        *
* Warning system is correct.         *
**************************************
```

Chart 101

```
*****************************************
* SHUT OFF VALVE 3 (4) BLUE MAGNETIC    *
* INDICATOR IS CROSS HATCHED.           *
*****************************************


*****************************************
* On panel 4-213 trip circuit breaker   *
* W4 (W8) map ref. D10 (C10) and on panel *
* 15-216 trip circuit breaker W6 (W6)   *
* position C19. In zone 631BT (632CT)   *
* disconnect electrical connector from  *
* shut off valve W20 (W24).             *
* On connector W20A (W24A) shunt terminals*
* F and D.                              *
* Set circuit breaker W6. SHUT OFF VALVE *
* 3 (4) magnetic indicator changes to   *
* OPEN.                                 *
*****************************************
        |              |               ------------------------
        |              |               | Replace SHUT OFF VALVE|
        OK             NOT OK----------| magnetic indicator    |
        |                              | W12 [1] (W16 [2]).    |
        |                              ------------------------
        |                              ------------------------
        |------------------------------| Replace shut off valve|
                                       | W20 [20] (W24 [21]).  |
                                       ------------------------
```

Chart 102

```
**************************************----------------------------
* PUMPS 3 (4) BLUE MAGNETIC INDICATOR*|GROUND EQUIPMENT REQUIRED   |
* DISPLAYS OFF.                      *|----------------------------|
**************************************|DESCRIPTION          PART No|
                                      |----------------------------|
                                      |MULTIMETER                  |
                                      ------------------------------

**************************************
* On RH HYD RLY BOX panel 3-123 on   *
* connector UT 1838-4 check voltage  *
* between Terminal C (A) and ground. *
* If,                                *
**************************************------------------------------
       |           |                  | Replace caption light      |
       0 V         28 V---------------| M 363 [7] (M 364 [8]).     |
       |                              ------------------------------
**************************************
* On panel 15-215, trip circuit     *
* breaker M 342 (M 343) map ref. E7  *
* (E 8). PUMPS 3 (4) BLUE magnetic   *
* indicator changes to ON. If        *
**************************************
       |           |                  ------------------------------
       OK          NOT OK-------------| Replace magnetic indicator |
       |                              | M 360 [3] (M 361 [4]).     |
       |                              ------------------------------
**************************************
* On RH HYD RLY BOX panel 3-123      *
* remove relay M 369 (M 368). On     *
* panel 15-215 set circuit breaker   *
* M 342 (M 343) map ref E7 (E8).     *
* PUMPS 3 (4) magnetic indicator     *
* still displays ON. If,             *
**************************************
       |           |                  ------------------------------
       |           NOT OK-------------| Replace switch M 345 [5]   |
       |                              | (M 346 [6]).               |
       |                              ------------------------------
       |                              ------------------------------
       |                              | Replace relay M 369 [18]   |
       OK-----------------------------| (M 368 [19]).              |
                                      ------------------------------
```

Chart 103

```
*************************************
* PUMP 3 (4) L/PRESS CAPTION LIGHT IS*
* OFF.                              *
*************************************

*************************************
* On HYDRAULIC MANAGEMENT panel press*
* L/PRESS 3 (4) BLUE caption light.  *
* PUMPS 3 (4) magnetic indicator     *
* changes to OFF. If,                *
*************************************
        |              |            ------------------------------
        OK             NOT OK---------| Check circuit breaker M 342|
        |                             | [13] (M 343 [14]).         |
        |                           ------------------------------
*************************************
* On panel 15-215 trip circuit       *
* breaker M 342 (M 343) position E 7 *
* (E 8).                             *
* Disconnect connector of pressure   *
* switch M 348 (M 348) zone 631AT    *
* (632AT).                           *
* Shunt terminals A and C of         *
* M 348A.                            *
* Set circuit breaker M 342 (M 343). *
* L/PRESS caption light of pump 3 (4)*
* comes on.                          *
*************************************
        |              |            ------------------------------
        |              NOT OK---------| Replace caption light      |
        |                             | M 363 [7] (M 364 [8]).     |
        |                           ------------------------------
        |                           ------------------------------
        |                             | Replace pressure switch    |
        OK----------------------------| M 348 [22] of pump 3       |
                                      | (M 348 [23] of pump 4).    |
                                    ------------------------------
```

Chart 104

```
*************************************
* ON PRESSURE INDICATOR WARNING FLAG *
* IS VISIBLE.                        *
*************************************


*************************************
* On panel 2-213 check circuit       *
* breaker 3D21 [10] position D15. If *
*************************************
        |              |
        |              |              -------------------------------
        |              |              | Replace circuit breaker     |
        |              NOT OK---------| 3D21 [10].                  |
        |                             -------------------------------
        |                             -------------------------------
        |                             | Replace pressure indicator  |
        OK----------------------------| 3D22 [9].                   |
                                      -------------------------------
```

Chart 105

```
**************************************-------------------------------
* PUMPS 3 (4) MAGNETIC INDICATOR     *|GROUND EQUIPMENT REQUIRED    |
* STILL DISPLAYS ON.                 *|-----------------------------|
**************************************|DESCRIPTION          PART No |
                                      |-----------------------------|
                                      |MULTIMETER                   |
                                      -------------------------------

**************************************
* On HYDRAULIC MANAGEMENT panel press*
* and hold during test L/PRESS 3 (4) *
* caption light.                     *
* On RH HYD RLY BOX panel 3-123, on  *
* connector UT1838-4 check voltage   *
* between terminal C (A) and ground. *
* If,                                *
**************************************
        |              |              -------------------------------
       28 V           0 V------------| Replace caption light        |
        |                            | M 363 [7] (M 364 [8]).       |
        |                             -------------------------------
**************************************
* Open panel 3-214, on terminal strip*
* UM2154-F check voltage between     *
* terminal 19 (14) and ground (with  *
* L/PRESS 3 (4) caption light hold   *
* pressed). If,                      *
**************************************
        |              |              -------------------------------
        |             0 V------------| Replace relay M 369 [19]     |
        |                            | (M 368 [19]).                |
        |                             -------------------------------
        |                             -------------------------------
        |                            | Replace magnetic indicator   |
       28 V--------------------------| M 360 [3] (M 361 [4]).       |
                                      -------------------------------
```

Chart 106

```
*************************************-------------------------------
* PUMPS 3 (4) MAGNETIC INDICATOR    *|GROUND EQUIPMENT REQUIRED     |
* STILL DISPLAYS ON.                *|------------------------------|
*************************************|DESCRIPTION          PART No  |
                                     |------------------------------|
                                     |MULTIMETER                    |
                                      -------------------------------

*************************************
* Open panel 3-214 ; on terminal    *
* strip UM2154-F check voltage      *
* between terminal 19 (14) and ground*
* If,                               *
*************************************
        |              |              ------------------------------
        |             0 V------------| Replace switch M 345 [5]     |
        |                            | (M 346 [6]).                 |
        |                             ------------------------------
        |                             ------------------------------
        |                            | Replace magnetic indicator   |
       28 V--------------------------| M 360 [3] (M 361 [4]).       |
                                      ------------------------------
```

Chart 107

GROUND EQUIPMENT REQUIRED	
DESCRIPTION	PART No
MULTIMETER	

```
**************************************
* MAGNETIC INDICATOR SHUT OFF VALVE  *
* 3 (4) IS STILL CROSS HATCHED.      *
**************************************

**************************************
* On panel 4-213 trip circuit breaker*
* W4 (W8) mpa ref. D10 (C10) and on  *
* panel 15-216 trip circuit breaker  *
* W6 (W6) position C19. In zone 631BT*
* (632CT) disconnect electrical      *
* connector of shut-off valve W20    *
* (W24). On connector W20A (W24A) on *
* shut-off valve check continuity    *
* between pins E and D. If,          *
**************************************
        |              |             ------------------------------
        |              |            | Replace shut-off valve W20 |
        |              NOT OK-------| [20] (W24 [21]).           |
        |                            ------------------------------
        |                            ------------------------------
        |                           | Replace magnetic indicator |
        OK--------------------------| W12 [1] (W16 [2]).         |
                                     ------------------------------
```

Chart 108

SHUT OFF VALVE 3 (4) MAGNETIC INDICATOR STILL DISPLAYS OPEN.

GROUND EQUIPMENT REQUIRED	
DESCRIPTION	PART No
MUTLTIMETER	

In zone 631 BT (632 CT), on shut off valve drive motor, check position indicator. Red indication is visible. If,

- **OK**: On panel 4-213 trip circuit breaker W4 (W8) position D10 (C10) and on panel 15-216 trip circuit breaker W6 (W6) position C19. In zone 631BT (632CT) disconnect electrical connector of shut-off valve W20 (W24). Set circuit breaker W4 (W8). Between terminals C and B of connector W20A (W24A) check voltage If,
  - **28 V**: Replace shut off valve W20 [20] (W24 [21]).
  - **0 V**: Replace switch M 345 [5] (M 346 [6]).
- **NOT OK**: On panel 4-213 trip circuit breaker W4 (W8) position D10 (C10) and on panel 15-216 trip circuit breaker W6 (W6) position C19. In zone 631BT (632CT) disconnect electrical connector of shut-off valve W20 (W24). On connector W20A (W24A), on shut-off valve check continuity between pins E and D. If,
  - **NOT OK**: Replace shut off valve [20] (W24 [21]).
  - **OK**: Replace indicator W12 [1] (W16 [2]). (W16 [2]).

Chart 109

```
***************************************-------------------------------
* SHUT OFF VALVE 3 (4) MAGNETIC       *|GROUND EQUIPMENT REQUIRED    |
* INDICATOR IS STILL CROSS HATCHED.   *|-----------------------------|
***************************************|DESCRIPTION         PART No |
                                       |-----------------------------|
                                       |MULTIMETER                   |
                                       -------------------------------

***************************************
* On panel 4-213 trip circuit         *
* breaker W4 (W8) position D10 (C10)  *
* and on panel 15-216 trip circuit   *
* breaker W6 (W6) position C19. In    *
* cone 631BT (632CT) disconnect       *
* electrical connector of shut-off    *
* valve W20 (W24). Set circuit       *
* breaker W4 (W8). Check voltage      *
* between terminals A and B of        *
* connector W20A (W24A). If,          *
***************************************
                                       -------------------------------
        28 V               0 V         | Replace switch M 345 [5]    |
                                       | (M 346 [6]).                |
                                       -------------------------------

***************************************
* On connector W20A (W24A), on shut   *
* off valve check continuity between  *
* terminals F and D. If               *
***************************************
        |              |               -------------------------------
        |              |               | Replace shut-off valve W20  |
        |              NOT OK----------| [21] (W24 [22]).            |
        |                              -------------------------------
        |                              -------------------------------
        |                              | Replace indicator W12 [1]   |
        OK-----------------------------| (W16 [2]).                  |
                                       -------------------------------
```

Chart 110

```
*************************************-------------------------------
* SHUT OFF VALVE 3 (4) MAGNETIC     *|GROUND EQUIPMENT REQUIRED    |
* INDICATOR STILL DISPLAYS SHUT.    *|-----------------------------|
*************************************|DESCRIPTION          PART No |
                                     |-----------------------------|
                                     | MULTIMETER                  |
                                     -------------------------------

*************************************
* On panel 4-213 trip circuit breaker*
* W4 (W3) position D10 (C10) and on *
* panel 15-216 trip circuit breaker *
* W6 (W6) position C19.             *
* In zone 631BT (632CT) disconnect  *
* electrical connector of shut-off  *
* valve W20 (W24). Set circuit      *
* breaker W4 (W8). Check voltage    *
* between terminals A and B of      *
* connector W20A (W24A). If,        *
*************************************
        |              |             -------------------------------
        |             0 V------------| Replace switch M 345 [5]    |
        |                            | (M 346 [6]).                |
        |                            -------------------------------
        |                            -------------------------------
        |                            | Replace shut off valve W20  |
       28 V--------------------------| [20] (W24 [21]).            |
                                     -------------------------------
```

Chart 111

```
*************************************
* HYDRAULIC SYSTEM PRESSURE IS      *
* INCORRECT.                        *
*************************************


*************************************
* On panel 2-213 trip circuit       *
* breakers 1D21, position C15 and   *
* 3D21 position D15.                *
* Interchange the two Green and Blue *
* pressure indicators.              *
* Set circuit breakers 1D21 and 3D21.*
* Pressurize Blue hydraulic system  *
* using electric pumps (Ref. 29-12-00*
* Servicing).                       *
* Pressure is normal. If,           *
*************************************
        |             |     ------------------------------
        |             |     | Replace pressure indicator |
        |             OK----| 3D22 [9].                  |
        |                   ------------------------------
        |                   ------------------------------
        |                   | Replace pressure           |
        NOT OK--------------| transmitter 3D23 [26].     |
                            ------------------------------
```

Chart 112

```
*************************************
* PUMP 3 (4) L/PRESS CAPTION LIGHT IS*
* ILLUMINATED (ENGINES OPERATING).   *
*************************************


*************************************
* On HYDRAULIC MANAGEMENT panel place*
* ON-OFF-SHUT control switch of pump *
* (the L/PRESS caption light of which*
* is off) in OFF position.           *
* Pressure remains correct. If       *
*************************************
       |              |
       |              |            ------------------------------
       |              |            | Replace hydraulic pump      |
       |              NOT OK-------| M 366 [24] indicated by     |
       |                           | warning.                    |
       |                           ------------------------------
       |                           ------------------------------
       |                           | Replace pressure switch     |
       OK--------------------------| M 348 [22] or [23] indi-    |
                                   | cated by warning.           |
                                   ------------------------------
```

Chart 113

```
*************************************
* HYDRAULIC SYSTEM PRESSURE READ ON  *
* INDICATOR IS ABNORMALLY HIGH.      *
*************************************


*************************************
* On HYDRAULIC MANAGEMENT panel place*
* ON-OFF-SHUT 3 control switch in OFF*
* position.                          *
* Indicated pressure is correct.     *
*************************************
        |             |             -----------------------------
        |             |             | Replace hydraulic pump    |
        |          NOT OK-----------| M 366 [25] of engine 4.   |
        |                           -----------------------------
        |                           -----------------------------
        |                           | Replace hydraulic pump    |
       OK---------------------------| M 366 [24] of engine 3.   |
                                    -----------------------------
```

Chart 114

```
*************************************---------------------------------
* L/PRESS 3 CAPTION LIGHT AND HYD    *|GROUND EQUIPMENT REQUIRED     |
* WARNING LIGHT DO NOT COME ON.      *|------------------------------|
**************************************|DESCRIPTION          PART No |
                                      |------------------------------|
                                      |MULTIMETER                    |
                                      --------------------------------

**************************************
* Engines shut down.                 *
* On HYDRAULIC MANAGEMENT panel place*
* ON-OFF-SHUT 3 control switch in ON *
* then in OFF position.              *
* In zone 435AB, check operation of  *
* pressurizing solenoid (characte-   *
* ristic noise).                     *
**************************************--------------------------------
        |              |              | On panel 15-215 trip          |
        |              |              | circuit breaker M 342         |
        |              |              | position E7. Open panel       |
        |              |              | 435AB (Ref. 71-00-00,         |
        OK             NOT OK---------| Servicing).                   |
        |                             | Disconnect connector M 366    |
        |                             | of pump solenoid. Set         |
        |                             | circuit breaker M 342.        |
        |                             | Check voltage between         |
        |                             | terminals A and B of          |
        |                             | connector M 366A.             |
        |                             --------------------------------
        |                                     |        |
        |                                     |        |
        |                 28 V----------------|        0 V
        |                  |                           |
----------------------  --------------------  ----------------------
| Replace pressure   |  | Replace hydraulic |  | Replace switch M 345|
| switch M 348 [22]. |  | pump M 366 [24].  |  | [5].                |
----------------------  --------------------  ----------------------
```

Chart 115

L/PRESS 4 CAPTION LIGHT AND HYD WARNING LIGHT DO NOT COME ON.

GROUND EQUIPMENT REQUIRED	
DESCRIPTION	PART No
MULTIMETER	

Engines shut down.
On HYDRAULIC MANAGEMENT panel place ON-OFF-SHUT 4 control switch in ON then in OFF position.
In zone 446 AB check operation of pressurizing solenoid (characteristic noise).

- **OK** → Replace pressure switch M 348 [23].
- **NOT OK** → On panel 15-215 trip circuit breaker M 343 position E8. Open panel 446 AB (ref. 71-00-00, Servicing). Disconnect connector M 366 of pump solenoid. Set circuit breaker M 343. Check voltage between terminals A and B of connector M 366A.
  - **28 V** → Replace hydraulic pump M 366 [25].
  - **0 V** → Replace switch M 346 [6].

Chart 116

ITEM No. AND DESCRIPTION	ACCESS PANEL	PANEL/ ZONE	EQUIP. IDENT.	POSITION	MANUAL REF. MAINT. TOPIC	WIRING DIAGRAM
[1] SHUT OFF VALVE magnetic indicator		3-214	W12	Flt. Eng. panel	29-00-00 R/I	29-12-01
[2] SHUT OFF VALVE magnetic indicator		3-214	W16	Flt. Eng. panel	29-00-00 R/I	29-12-01
[3] PUMPS - 3 magnetic indicator		3-214	M360	Flt. Eng. panel	29-00-00 R/I	29-12-01
[4] PUMPS - 4 magnetic indicator		3-214	M361	Flt. Eng. panel	29-00-00 R/I	29-12-01
[5] Control switch		3-214	M345	Flt. Eng. panel	29-00-00 R/I	29-12-01
[6] Control switch		3-214	M346	Flt. Eng. panel	29-00-00 R/I	29-12-01
[7] L/PRESS caption light pump 3		3-214	M363	Flt. Eng. panel	29-00-00 R/I	29-12-01
[8] L/PRESS Caption Light pump 4		3-214	M364	Flt. Eng. panel	29-00-00 R/I	29-12-01
[9] Pressure Indicator		3-214	3D22	Flt. Eng. panel	29-00-00 R/I	29-31-11
[10] Circuit breaker		2-213	3D21	D 15	24-50-00 R/I	29-31-11
[11] Circuit breaker		4-213	W4	D 10	24-50-00 R/I	29-12-01
[12] Circuit breaker		4-213	W8	C 10	24-50-00 R/I	29-12-01
[13] Circuit breaker		15-215	M342	E 7	24-50-00 R/I	29-12-01

Printed in England

ITEM No. AND DESCRIPTION	ACCESS PANEL	PANEL/ ZONE	EQUIP. IDENT.	POSITION	MANUAL REF. MAINT. TOPIC	MANUAL REF. WIRING DIAGRAM
[14] Circuit breaker		15-215	M343	E 8	24-50-00 R/I	29-12-01
[15] Circuit breaker		15-216	W6	C 19	24-50-00 R/I	29-12-01
[16] Engine shut down Handle No.3		4-211	3W160	Pilot's roof panel	26-22-11 R/I	26-22-01
[17] Engine shut down handle No.4		4-211	4W160	Pilot's roof panel	26-22-11 R/I	26-22-01
[18] Depressu-rization relay	123AB	3-213	M369		29-00-00 R/I	29-12-01
[19] Depressu-rization relay	123AB	3-123	M368		29-00-00 R/I	29-12-01
[20] Pump 3 shut-off valve	631BT		W20		29-12-42 R/I	29-12-01
[21] Pump 4 shut off valve	632CT		W24		29-12-41 R/I	29-12-01
[22] Pressure switch	631AT		M348		29-12-72 R/I	29-12-01
[23] Pressure switch	632AT		M348		29-12-72 R/I	29-12-01
[24] Depressu-rizing solenoid pump 3	435AB		M366		29-12-72 R/I	29-12-01
[25] Depressu-rizing solenoid pump 4	446AB		M366		29-12-72 R/I	29-12-01

ITEM No. AND DESCRIPTION	ACCESS PANEL	PANEL/ ZONE	EQUIP. IDENT.	POSITION	MANUAL REF. MAINT. TOPIC	WIRING DIAGRAM
[26] Pressure transmitter	151DB	152	3D23		29-00-00 R/I	29-31-11

Component Identification
Table 101

BLUE SYSTEM - SERVICING

1. General

A. Procedure for bleeding hydraulic pump suction lines.

B. Blue system pressurization using hydraulic ground power unit.

C. Blue system pressurization using ground pressurizing system (electric pumps).

D. Blue system depressurization.

2. Procedure for Bleeding Hydraulic Pump Suction Lines

A. Equipment and Materials

DESCRIPTION	PART NO.
Transparent Vinyl Hose Adaptable to Shut-Off Valve Elbow Coupling	
Hydraulic Tank Pressurizing Equipment (Air Bottle with Pressure Reducing Valve)	
Container : Capacity approx. 5 litres (1.30 US Gal, 1.10 Imp Gal)	
Corrosion Resistant Steel Lockwire, R Dia. 0.041 in. (1 mm) Condition A	
Access Platform - 13 ft. 7 in. (4.06 m)	
Wing Protective Mat	
Hydraulic Fluid (Ref. 20-30-00, No.011)	
Electrical Ground Power Unit	

R

B. Prepare

(1) Position access platform and wing protective mat.

(2) Open access doors on upper wing surface as follows :

(a) No.3 engine - access door 631BT

(b) No.4 engine - access door 632CT and DT.

(3) Open access door 153BB, depressurize Blue system tank and connect tank pressurizing equipment to ground connector 0191.

(4) Make certain that the following circuit breakers are set :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
ENG 3 SHUT OFF VALVES CONT	4-213	W 4	D10
SHUT OFF VALVES IND	15-216	W 6	C19

(5) Connect electrical ground power unit and energize the
R aircraft electrical network (Ref. 24-41-00, Servicing).

(6) On Flight Engineer's hydraulic MANAGEMENT panel, make certain that SHUT OFF VALVES-3-BLUE magnetic indicator displays OPEN.

(7) De-energize the aircraft electrical network (Ref. 24-41-00, Servicing).

C. Bleed

(1) Unscrew and remove blanking cap on bleed valve located on shut-off valve elbow coupling. Connect plastic hose to bleed valve and place other end in container provided.

(2) Pressurize hydraulic tanks to 1 bar (14.504 psi) (Ref. 29-13-00, Servicing).

(3) Open bleed valve and allow hydraulic fluid to flow into container until it no longer contains any air bubbles.

(4) Close shut-off valve bleed valve, wet torque with Product No.011 to between 35 and 49 lbf. in. (0.40 and 0.55 m.daN), then wirelock.

(5) Remove plastic hose, refit cap on bleed valve and wirelock.

(6) Wipe off all traces of fluid.

(7) Replenish tank as required (Ref. 12-12-29).

D. Close-Up

(1) Disconnect and remove tank pressurizing equipment.

(2) Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(3) Disconnect electrical ground power unit (Ref. 24-41-00, Servicing).

(4) Close access doors.

(5) Remove wing protective mat.

(6) Remove access platform.

3. Blue System Pressurization Using Hydraulic Ground Power Unit

WARNING : MAKE CERTAIN THAT THE POSITIONS OF NOSE AND MAIN GEAR DOORS CORRESPOND WITH THE ACTUAL POSITIONS OF THE RESPECTIVE OPERATING HANDLES.
HANDLE LOCKED, INDICATOR PLATE SHOWING WHITE : DOORS CLOSED.
HANDLE LOCKED, INDICATOR PLATE SHOWING RED : DOORS OPEN.

MAKE CERTAIN THAT THE LANDING GEAR POSITION INDICATED ON THE GEARS POSITION INDICATING UNIT CORRESPONDS WITH THE ACTUAL POSITION OF THE LANDING GEAR.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE, MAKE CERTAIN THAT THE TRAVEL RANGES OF THE CONTROL SURFACES ARE CLEAR.

BEFORE PRESSURIZING HYDRAULIC SYSTEMS, CHECK THAT ALL CONTROLS ARE SET TO CORRESPOND WITH THE ACTUAL POSITION OF THE SERVICES THEY OPERATE.

MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

A. Equipment and Materials

DESCRIPTION	PART NO.
Ground Power Unit - Hydraulic - Power and Preliminary Testing	EMH398E
Hydraulic Tank Pressurizing Equipment (Air Bottle with Pressure Reducing Valve)	
Access Platforms - 5 ft. 11 in. (1.8 m)	
Electrical Ground Power Unit	

B. Prepare

(1) Take the precautions described in the previous WARNING paragraph.

(2) Position access platforms.

(3) Open access door 151DB under fuselage and depressurize Blue system by actuating control lever of associated pressure relief and manual unloading valve (3241).

Printed in England

(4) Open engine panel 435AB (Ref. 71-00-00, Servicing).

(5) Open access door 153BB and make certain that fluid level in Blue tank is normal.

(6) Pressurize hydraulic tanks (Ref. 29-13-00, Servicing).

(7) Connect electrical ground power unit (Ref. 24-41-00, Servicing).

(8) Make certain that the following circuit breakers are set :

SERVICE	PANEL	CIRCUIT BREAKER		MAP REF.
ENG3 SHUT-OFF VALVE CONT	4-213	W	4	D10
SHUT-OFF VALVES IND	15-216	W	6	C19

C. Pressurization (Ref. Fig. 301)

(1) Energize the aircraft electrical network (Ref. 24-41-00, servicing).

(2) On Flight Engineer's HYDRAULIC MANAGEMENT panel, make certain that SHUT-OFF VALVES-3-BLUE magnetic indicator displays OPEN.

(3) In zone 435, remove caps from ground connectors, and connect hydraulic ground power unit lines.

(4) Start up hydraulic ground power unit, and increase system pressure.

(5) Proceed with tests requiring hydraulic pressure.

D. Procedure for Stopping Pressurization

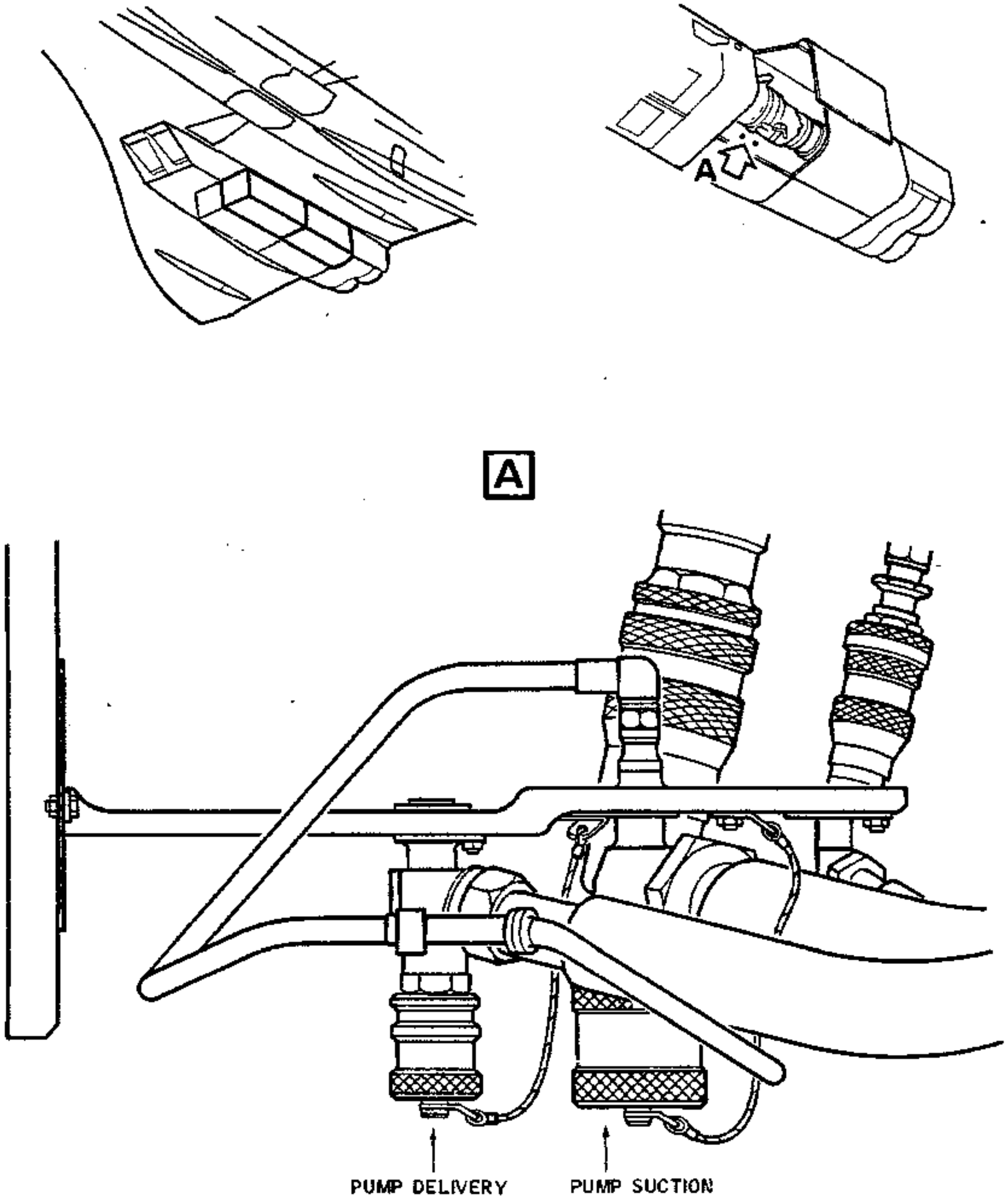
(1) Shut down hydraulic ground power unit.

(2) At zone 152, depressurize Blue system.

(3) Disconnect hydraulic ground power unit.

(4) Install caps on ground connectors.

E. Close-Up



CMA 29 12 00 3 AAMO

Location of Blue System Ground Connectors
Figure 301

(1) Close engine panels 435AB (Ref. 71-00-00, servicing) and access doors 151DB and 153BB.

(2) De-energize the aircraft electrical network and disconnect electrical ground power unit.

(3) Remove hydraulic ground power unit.

(4) Remove access platforms.

4. Blue System Pressurization Using Ground Pressurizing System (Electric Pump)

WARNING : MAKE CERTAIN THAT THE POSITIONS OF NOSE AND MAIN GEAR DOORS CORRESPOND WITH THE ACTUAL POSITIONS OF THE RESPECTIVE OPERATING HANDLES.
HANDLE LOCKED, INDICATOR PLATE SHOWING WHITE : DOORS CLOSED.
HANDLE LOCKED, INDICATOR PLATE SHOWING RED : DOORS OPEN.

MAKE CERTAIN THAT THE LANDING GEAR POSITION INDICATED ON THE GEARS POSITION INDICATING UNIT CORRESPONDS WITH THE ACTUAL POSITION OF THE LANDING GEAR.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE, MAKE CERTAIN THAT THE TRAVEL RANGES OF THE CONTROL SURFACES ARE CLEAR.

BEFORE PRESSURIZING HYDRAULIC SYSTEMS, CHECK THAT ALL CONTROLS ARE SET TO CORRESPOND WITH THE ACTUAL POSITION OF THE SERVICES THEY OPERATE.

MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

A. Equipment and Materials

DESCRIPTION	PART NO.
Electrical Ground Power Unit	
Access Platform - 9 ft. 8 in. (2.96 m)	

B. Prepare

(1) Take the precautions described in the previous WARNING paragraph.

(2) Open access door 153BB under fuselage and make certain that fluid level in Blue tank is normal.

(3) Make certain that the following circuit breakers are set :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
HYD GRND CHECK OUT PUMP CONT	14-216	M 656	A16
HYD GRND CHECK OUT SEL VALVE CONT	15-216	M 626	F22

(4) Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing).

C. Pressurization

(1) Pressurize hydraulic tanks (Ref. 29-13-00, Servicing).

(2) Pressurize Blue system as follows :

- On Flight Engineer's GROUND HYD CHECK OUT panel.

(a) Place selector switch in GREEN BLUE position.

(b) Place PUMP 2 B-Y switch in ON position.

(3) The Blue system pressure displayed on Flight Engineer's HYDRAULIC MANAGEMENT panel must rise and stabilize at between 3408 and 3553 psi (235 bars and 245 bars).

(4) Proceed with tests requiring Blue system hydraulic pressure.

D. Procedure for Stopping Pressurization

(1) On Flight Engineer's GROUND HYD CHECK OUT panel.

(a) Place PUMP 2 B-Y switch in OFF position.

(b) Place selector switch in YELLOW-YELLOW position.

E. Close-Up

(1) De-energize the aircraft electrical network and disconnect electrical ground power unit (Ref. 24-41-00, Servicing).

(2) Close access doors.

(3) Remove access platform.

5. Blue System Depressurization

WARNING : BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE, MAKE CERTAIN THAT THE TRAVEL RANGES OF THE CONTROL SURFACES ARE CLEAR. MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

A. General

Hydraulic systems can be depressurized on the ground by means of the pressure relief and manual unloading valves, located in zone 151, near access door 151DB.

B. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform, 2.960 m (9 ft. 8 in.)	

C. Prepare

(1) Open access door 151DB under fuselage.

D. Depressurization (Ref. Fig. 302)

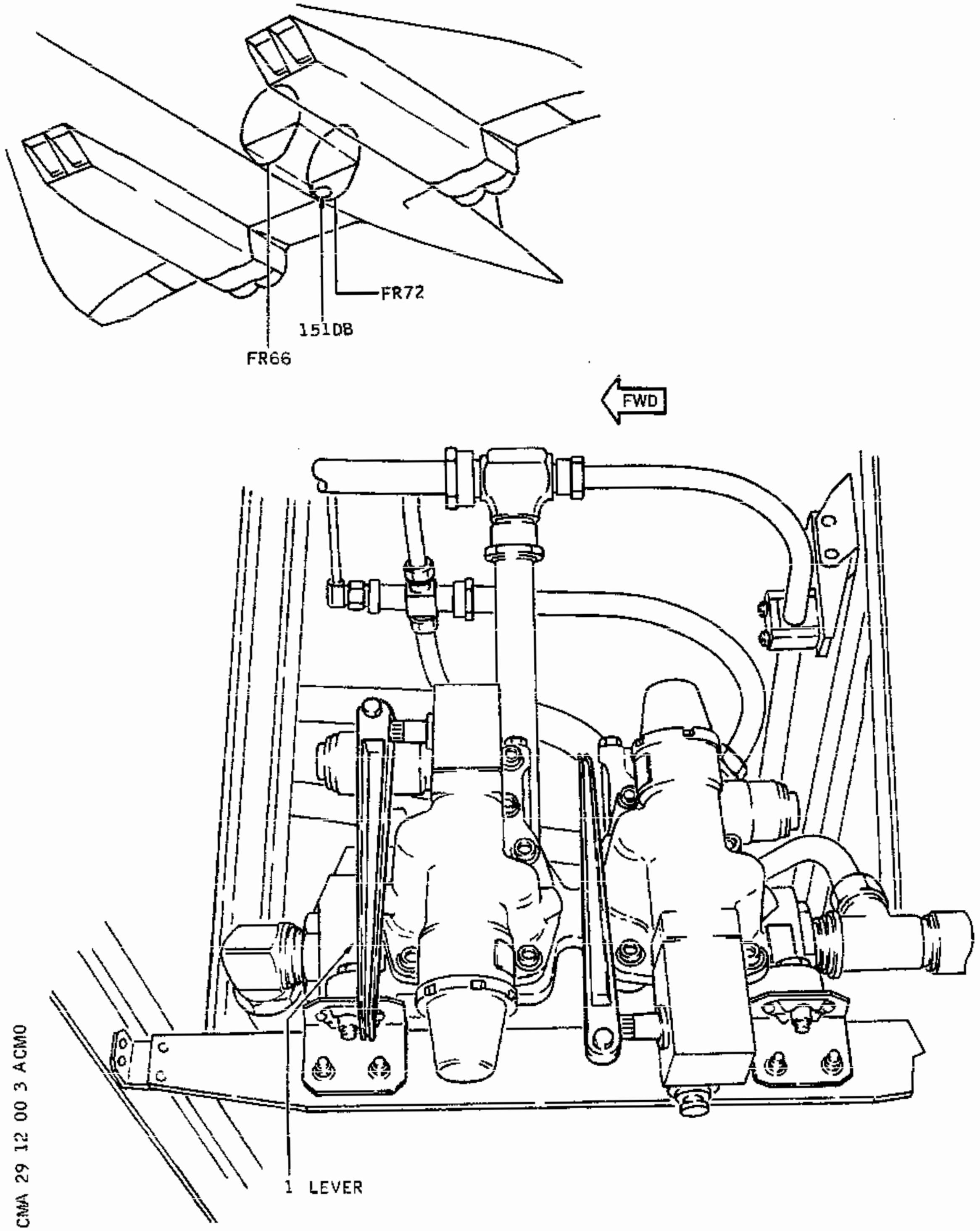
(1) Pull lever (1) on pressure relief and manual unloading valve (3241).

(2) Check on pressure gange of Blue system accumulation (3235) that system pressure drops.
Accumulation (3235) is located in the same zone as the pressure relief and manual unloading valves.

(3) When system pressure is nil, return lever (1) to its original position.

E. Close-up

(1) Close access door and remove access platform.



Pressure Relief and Manual Unloading Valve
Figure 302

1. General

R The two engine-driven Blue hydraulic system pumps are normally pressurized when the solenoid controlling their depressurization is not energized.

2. Operational Test

Check for correct operation of pump depressurization system.

A. Equipment and Materials

DESCRIPTION	PART NO.
Electrical Ground Power Unit	
Ground Service Interphone	

B. Prepare

(1) Trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
ENG3 BLUE PUMP CONT IND	15-215	M 342	E 7
ENG4 BLUE PUMP CONT IND		M 343	E 8

(2) Check that BLUE switches 3 and 4 on Flight Engineer's HYDRAULIC MANAGEMENT panel are in ON position.

(3) Make certain that the following circuit breakers are set :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
M.W.S. SUP1	1-213	W 252	N21
AUDIO WARNING SYS SUP1		M 371	M21
M.W.S. SUP2	5-213	W 251	D15
AUDIO WARNING SYS SUP2		W 372	C17

Printed in England

(4) Connect electrical ground power unit, and energize the aircraft electrical network (Ref. 24-41-00, Servicing).

- HYD warning light on master warning panel must come on.
- The single-stroke gong sounds.

C. Tests

(1) On panel 15-215, reset circuit breaker (M342).

- L/PRESS-3-BLUE caption light on Flight Engineer's HYDRAULIC MANAGEMENT panel must come on.

(2) On Flight Engineer's HYDRAULIC MANAGEMENT panel, press L/PRESS-3-BLUE caption light.

- Caption light must remain illuminated
- PUMP-3-BLUE magnetic indicator must display OFF

- In zone 435 the depressurization solenoid (energized) must operate (aural confirmation). The pump is depressurized (de-activated).

(3) On Flight Engineer's panel, release L/PRESS-3-BLUE caption light.

- Caption light must remain illuminated
- PUMPS-3-BLUE magnetic indicator must display ON
- In zone 435 the depressurization solenoid is no longer energized. The pump becomes pressurized (active).

(4) On panel 15-215, reset circuit breaker (M272).

- L/PRESS-4-BLUE caption light on Flight Engineer's HYDRAULIC MANAGEMENT panel must come on

(5) On Flight Engineer's HYDRAULIC MANAGEMENT panel, press L/PRESS-4-BLUE caption light.

- Caption light must remain illuminated

- PUMPS-4-BLUE magnetic indicator must display OFF
- In zone 446, the depressurization solenoid (energized) must operate (aural confirmation). The pump is depressurized (de-activated).

(6) On Flight Engineer's panel, release L/PRESS-4-BLUE caption light.

Printed in England

- Caption light must remain illuminated
R - PUMPS-4-BLUE magnetic indicator must display ON
- In zone 446 the depressurization solenoid is no longer energized.

R (7) On Flight Engineer's HYDRAULIC MANAGEMENT panel, place BLUE switch 3 in OFF position.

R - L/PRESS-3-BLUE caption light must come on
R - PUMPS-3-BLUE magnetic indicator must display OFF
- In zone 435, the depressurization solenoid (energized) must operate (aural confirmation). The pump is depressurized (de-activated).

R (8) On Flight Engineer's panel, return BLUE switch 3 to ON position.

R - PUMPS-3-BLUE magnetic indicator must display ON
R - L/PRESS-3-BLUE caption light must remain illuminated
- In zone 435, the depressurization solenoid is no longer energized.

R (9) On Flight Engineer's HYDRAULIC MANAGEMENT panel, place BLUE switch 4 in OFF position.

R - L/PRESS-4-BLUE caption light must be illuminated
R - PUMPS-4-BLUE magnetic indicator must display OFF
- In zone 446, the depressurization solenoid (energized) must operate (aural confirmation). The pump is depressurized (de-activated).

R (10) On Flight Engineer's panel, return BLUE switch 4 to ON position.

R - PUMPS-4-BLUE magnetic indicator must display ON
R - L/PRESS-4-BLUE caption light must remain illuminated
- In zone 446, the depressurization solenoid is no longer energized.

D. Close-Up

De-energize aircraft electrical network and disconnect
R electrical ground power unit (Ref. 24-41-00, Servicing).

HYDRAULIC FLUID/FUEL SINGLE HEAT EXCHANGER - REMOVAL/INSTALLATION

WARNING : MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE, MAKE CERTAIN THAT THE TRAVEL RANGES OF THE ELEVONS ARE CLEAR.

1. General

Removal for Replacement

2. Hydraulic Fluid/Fuel Single Heat Exchanger

A. Equipment and Materials

	DESCRIPTION	PART NO.
	Electrical Ground Power Unit	
	Drainage Equipment - Hydraulic Fluid, by Suction Line Self-Sealing Coupling	D921595000
R	Blanking Plugs/Caps for Hydraulic Fluid and Fuel Lines	
	Wing Protective Mats	
	Access Platform - 13 ft. 7 in. (4.06 m)	
	Container for Recovery of Hydraulic Fluid, Capacity : 15 litres (3.30 Imp. Gal, 3.70 US Gal)	
	Container for Recovery of Fuel	
	Hydraulic Fluid (Ref. 20-30-00, No.011)	
R	Corrosion-Resistant Steel Lockwire, Condition A, Dia. 0.020 in. (0.5mm)	
R	Corrosion-Resistant Steel Lockwire - Condition A, Dia. 0.032 in. (0.8mm)	
	Safety Clips	

B. Prepare

(1) Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing).

(2) Open access doors 631AT and 631BT.

(3) On Flight Engineer's HYDRAULIC MANAGEMENT panel, make certain that SHUT-OFF VALVES - BLUE 1 magnetic indicator displays OPEN.

(4) On FUEL MANAGEMENT PANEL, make certain by means of LP VALVE magnetic indicator that fuel shut-off valve of associated engine is closed.

(5) De-energize aircraft electrical network
R (Ref. 21-41-00, Servicing).

(6) Trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER		MAP REF.
ENG3 SHUT-OFF VALVES CONT	4-213	W	4	D10
SHUT-OFF VALVES IND	15-216	W	6	C19
TANK 3 LP VALVE SUP2	15-215	3Q	1	C20

(7) Open panel 435AB on engine 3 (Ref. 71-00-00, Servicing)

(8) Remove drain-plug under engine fuel feed filter and drain fuel into container provided.

(9) Unscrew bleed plugs on recirculation valves.

(10) Open access door 153AB under fuselage and depressurize Blue system tank by opening associated depressurization valve.

(11) Open access door 151DB under fuselage and depressurize Blue system by actuating control lever of associated pressure relief and manual unloading valve.

(12) Remove blanking plug and open bleed valve on hydraulic shut-off valve.

(13) Disconnect Blue pump suction line at self-sealing

coupling in zone 435AB.

(14) Connect hydraulic fluid drainage equipment and drain pump suction line into container provided.

(15) Close bleed valve on hydraulic shut-off valve.

C. Remove

(1) Remove air/fuel heat exchanger fuel supply line :

(a) Cut and remove lockwire and remove screws (7) attaching adaptor (5). Remove bonding strip.

(b) Remove flange attachment screws at other end of line.

(c) Remove line.

(2) Remove fuel Y-line :

(a) Fold back safety tabs and remove attaching screws (13).

(b) Remove bonding strip.

(c) Unscrew engine feed line coupling nut.

(d) Unscrew air/fuel heat exchanger return line coupling nut.

(e) Remove Y-line.

(3) Remove air/fuel heat exchanger fuel return line :

(a) Disconnect bonding strip.

(b) Unscrew coupling nut.

(c) Remove line.

(4) Disconnect heat exchanger outlet hydraulic line :

(a) Remove from brackets clamps supporting line (15). supports.

(b) Unscrew coupling nut (16).

(5) Disconnect heat exchanger inlet hydraulic line :

(a) Remove from brackets clamps supporting line (12).

(b) Unscrew coupling nut (11).

(6) Cut and remove lockwire and remove attachment screws (1), remove and retain washers (2).

(7) Remove heat exchanger :

(a) Remove attaching screws (3) and (9).

(b) Remove split (17) bolt (19) and washer (18).

(c) Remove heat exchanger (8) from its mounting.

(d) Cap all open line ends.

D. Install

NOTE : The seals must be lubricated with Product No.011.

(1) Install heat exchanger :

(a) Remove caps from fuel inlet (BY-PASS) line.

(b) Position heat exchanger (8) on its mounting and push home.

(c) Install attaching screws (3) and (9) and washers (4) and (10).

(d) Insert bolt (19) install washer (18) and safety with split pin (17).

(e) Tighten attaching screws (3) and (9).

(f) Install screws (1) with washers (2) and bonding strip.

(g) Wirelock screws (1) through access door 631AT, not forgetting to attach bonding strip.

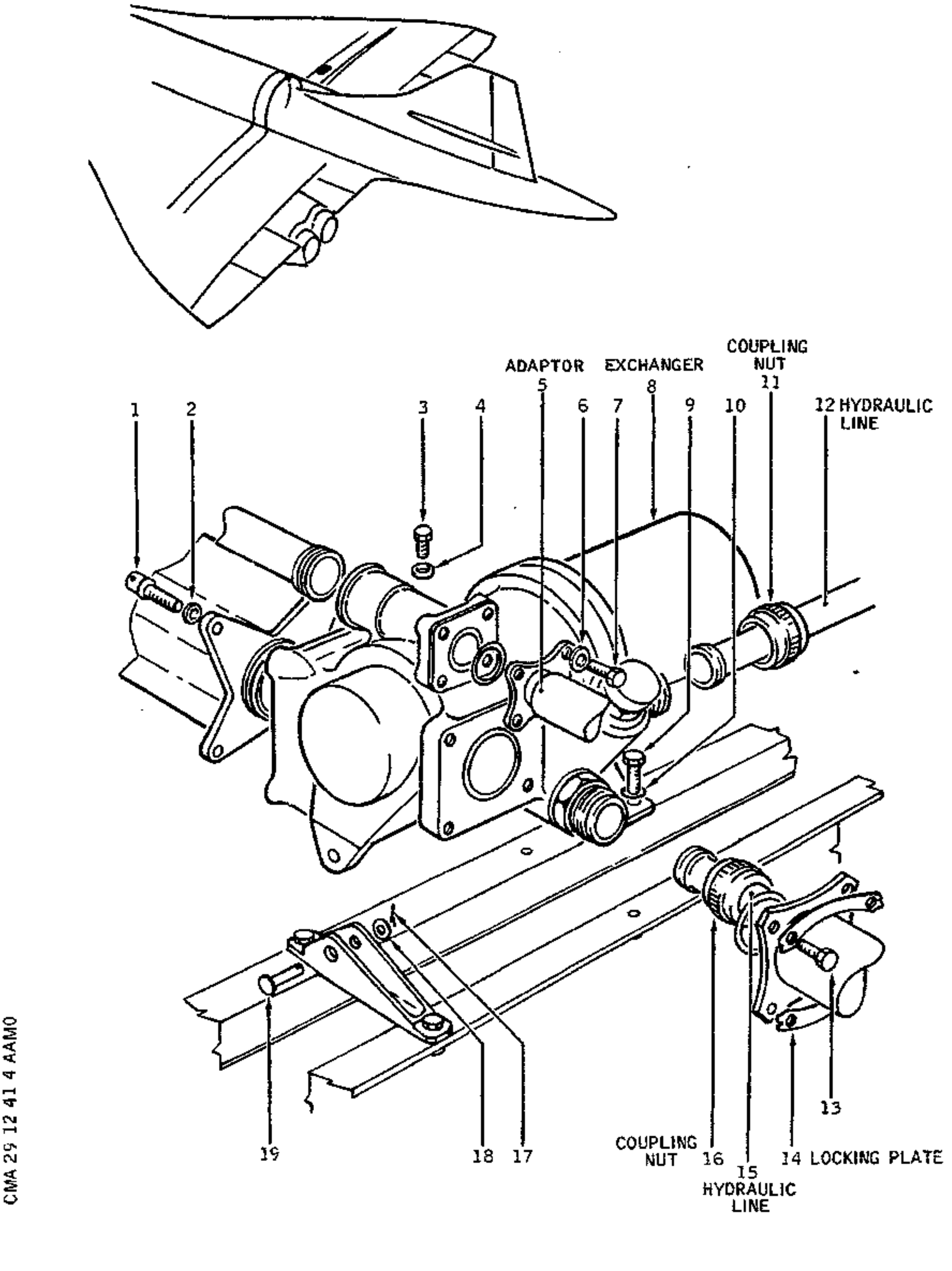
(2) Connect heat exchanger inlet hydraulic line (12) :

(a) Remove blanking cap, replace line (12) seals and fit line into heat exchanger.

(b) Tighten coupling nut (11).

(c) Secure line (12) support clamps to their brackets.

(3) Connect heat exchanger outlet hydraulic line (15) :



Single Heat Exchanger
Figure 401

(a) Remove blanking cap, replace line (15) seals and fit line into heat exchanger.

(b) Tighten coupling nut (16).

(c) Secure line (15) support clamps to their brackets.

(4) Install air/fuel heat exchanger fuel return line :

(a) Remove blanking caps and replace seals.

(b) Tighten coupling nut on air/fuel heat exchanger side.

(c) Attach bonding strip.

(5) Install fuel Y-line :

(a) Replace seals and position Y-line on heat exchanger.

(b) Install locking plate (14) and attaching screws (13).

(c) Tighten screws (13) and fold over tabs of locking plate (14).

(d) Tighten coupling nut on engine feed side.

(e) Attach bonding strip.

(f) Tighten coupling nut on air/fuel heat exchanger return line.

(6) Install air/fuel heat exchanger supply line :

(a) Install adaptor (5) on line.

(b) Position line.

(c) Attach adaptor to heat exchanger with screws (7) and washers (6). Do not omit bonding strip.

(d) Tighten screws and wirelock.

(e) Install attaching screws on the opposite side.

(f) Attach bonding strip.

(7) Remove hydraulic fluid drainage equipment.

(8) Connect hydraulic pump suction lines.

(9) Close and wirelock fuel drain plug.

(10) Close and wirelock fuel air vent plug.

R (11) Close tank depressurization valve and secure with a
R safety pin.

R (12) Bleed pump suction line (Ref. 29-12-00, Servicing).

R (13) Wet torque shut-off valve bleed valve with Product
R No.011 to between 0.40 and 0.55 m.daN (35 and 49 lbf.
R in.). Wirelock.

(14) Cap bleed valve and wirelock.

R (15) Replenish hydraulic tank as required (Ref. 12-12-29).

E. Test

Check for absence of external leakage on the installation during next engine run-up.

F. Close-Up

(1) Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(2) Clean heat exchanger and adjacent area. Make certain that no trace of hydraulic fluid remains.

(3) Remove safety clips and tags and reset circuit-breakers.

(4) Close engine panel.

(5) Disconnect and remove electrical ground power unit.
R (Ref. 24-41-00, Servicing).

(6) Close access doors.

(7) Remove wing protective mat.

(8) Remove access platform.

HYDRAULIC SHUT-OFF VALVE - REMOVAL/INSTALLATION

WARNING : MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE, MAKE CERTAIN THAT THE TRAVEL RANGES OF THE ELEVONS ARE CLEAR.

1. General

R The removal/installation procedure described in this topic
R applies to both shut-off valves in the Blue system.

2. Shut-Off Valves

A. Equipment and Materials

DESCRIPTION	PART NO.
Wing Protective Mats	
Blanking Plugs/Caps	
Access Platform - 13 ft. 7 in. (4.06 metres)	
Container : Capacity 15 litres (3.70 US Gal, 3.30 Imp. Gal)	
Hydraulic Tank Pressurizing Equipment (Air Bottle with Pressure Reducing Valve)	
Hydraulic Fluid (Ref. 20-30-00, No.011)	
Corrosion Resistant Steel R Lockwire Dia. = 0.041 in. (1 mm), Condition A	
Drainage Equipment - Hydraulic Fluid, by Suction Line Self-Sealing Coupling	D921595000

B. Prepare

(1) Open access door 631BT or 632CT, and 632DT on RH wing.

R (2) Open access door 153BB under fuselage and depressurize Blue system tank by opening associated depressurization valve.

(3) Open access door 151CB under fuselage and depressurize Blue system by actuating control lever of associated pressure relief and manual unloading valve.

(4) Trip, safety and tag the following circuit breakers.

(a) For engine 3 shut-off valve :

	SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
R	ENG3 SHUT OFF VALVES CONT	4-213	W 4	D10
	HYD GRND CHECK OUT SEL VALVE CONT	15-216	M 626	F22
	SHUT OFF VALVES IND		W 6	C19

(b) For engine 2 shut-off valve :

	SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
R	ENG4 SHUT OFF VALVES IND	4-213	W 8	C10
	HYD GRND CHECK OUT SEL VALVE CONT	15-216	M 626	F22
	SHUT OFF VALVES IND		W 6	C19

(5) Remove blanking plug (4) and open bleed valve (5) on shut-off valve to be removed.

R (6) Open access panel 435AB or 446AB on engine 3 or 4
R (Ref. 71-00-00, Servicing). Disconnect hydraulic pump suction line at self-sealing coupling.

(7) Install drainage equipment and allow hydraulic fluid to flow into container provided.

R (8) Connect tank pressurizing equipment to ground connector 0191 zone 153.

C. Remove

Printed in England

(1) Disconnect electrical connector (6).

(2) Disconnect hydraulic suction line (1).

(3) Cut and remove lockwire and remove bolts (3) and (8) ; remove bonding strip.

(4) Remove shut-off valve.

(5) Cap open line ends.

D. Preparation of Replacement Component

E. Install

(1) Remove blanking caps.

(2) Replace shut-off valve seal (7) (lubricate seal with Product No.011).

(3) Position shut-off valve.

CAUTION : DO NOT DAMAGE THE SEAL.

(4) Secure shut-off valve with bolts (3) and (8) without tightening. Do not omit washers (2) and bonding strip.

(5) Connect hydraulic suction line (1).

(6) Fully tighten and dry torque bolts (3) and (8) to bet-
R ween 0.80 and 0.95 m.daN (70.776 and 84.046 lbf.in.). Wirelock.

(7) Tighten hydraulic suction line (1).

(8) Connect electrical connector (6).

(9) Disconnect drainage equipment.

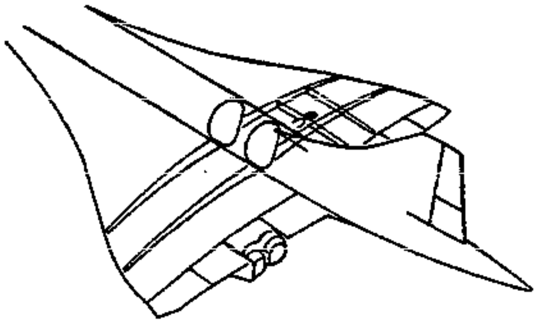
(10) Connect pump suction line to self-sealing coupling.

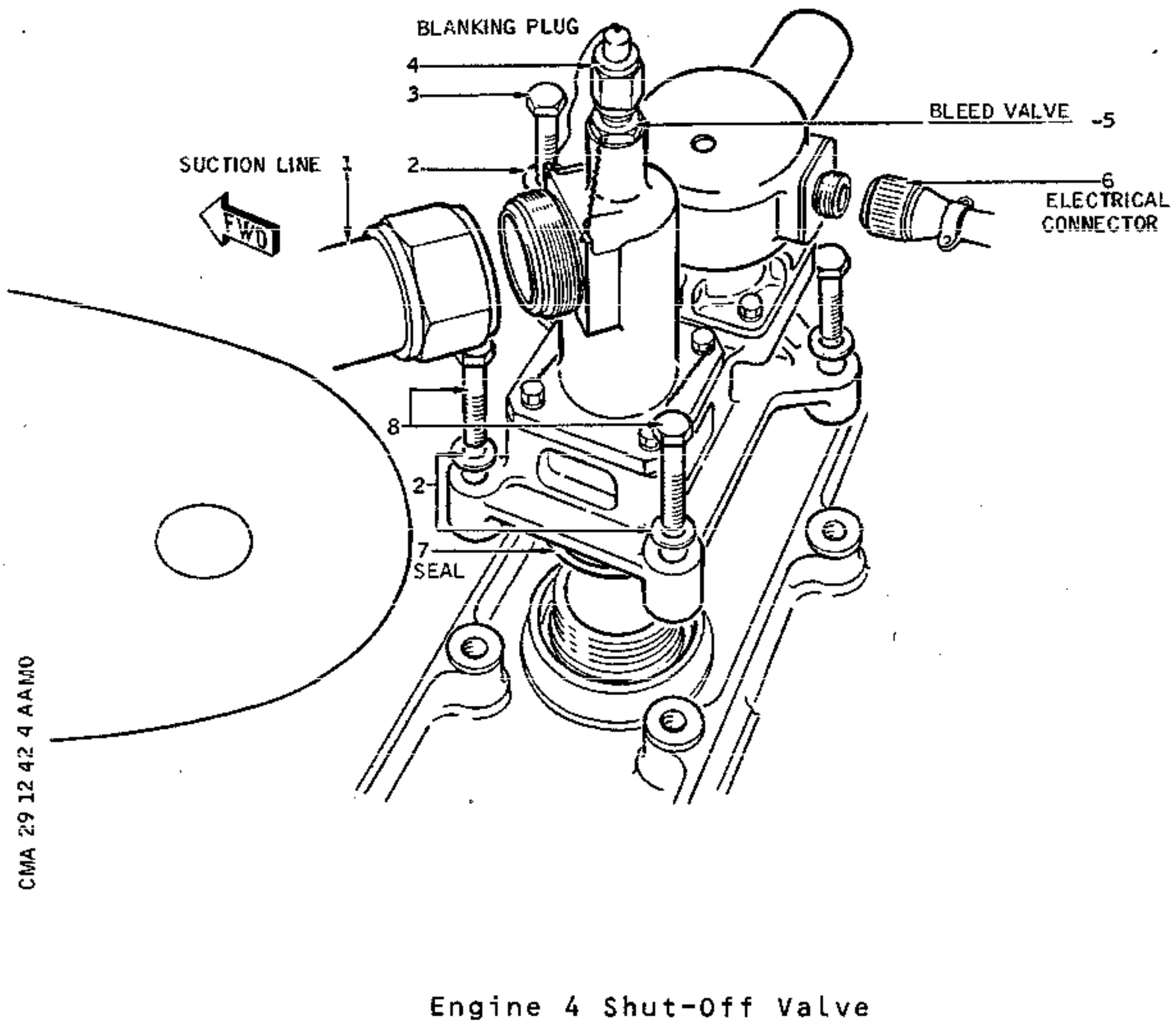
(11) Remove safety clips and tags and reset circuit breakers.

R (12) Close tank depressurization valve and secure with a
R safety pin.

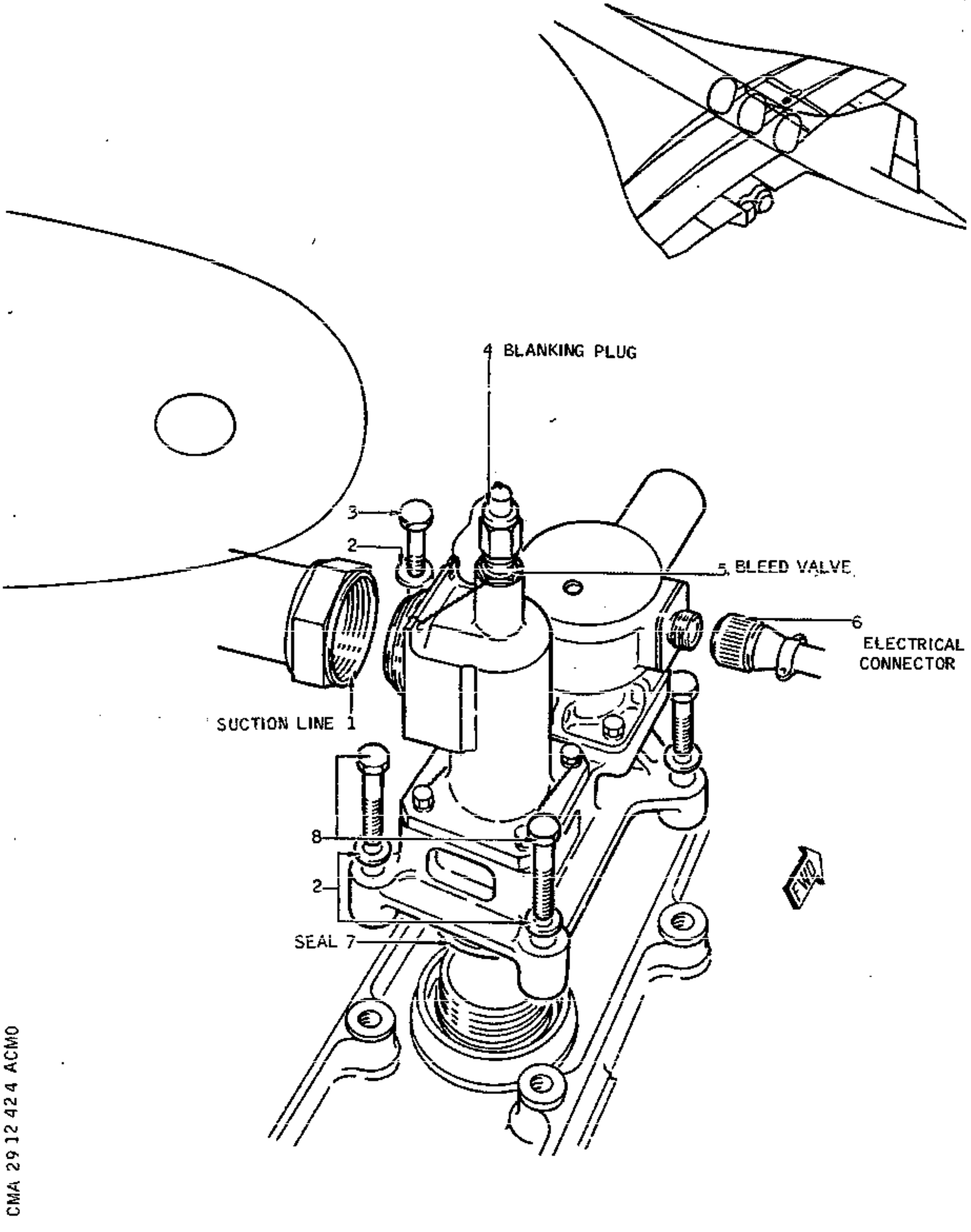
(13) Bleed pump suction line (Ref. 29-12-00).

R (14) Fully tighten and wet torque shut-off valve bleed valve
R with Product No.011 to between 0.40 and 0.55 m.daN





Engine 4 Shut-Off Valve
Figure 401



Engine 3 Shut-Off Valve
Figure 402

R (35 and 49 lbf.in.). Wirelock.

(15) Position blanking plug (4) on bleed valve and wirelock.

R (16) Replenish hydraulic tank as required (Ref. 12-12-29).

(17) Clean shut-off valve and adjacent area. Make certain that no trace of hydraulic fluid remains.

F. Tests

R (1) Pressurize hydraulic tanks to 70 psi (4.8 bars) and check for external leakage on shut-off valve.

R (2) Test shut-off valve (Ref. 29-12-42, Adjustment/Test).

G. Close-Up

R (1) Disconnect and remove tank pressurizing equipment.

(2) Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(3) Close access doors.

R (4) Close engine panel (Ref. 71-00-00, Servicing).

(5) Remove wing protective mat.

(6) Remove wing access platform.

HYDRAULIC SHUT-OFF VALVE - ADJUSTMENT/TEST

1. General

The shut-off valves, which are mounted on the hydraulic pump suction line, enable the supply of hydraulic fluid to be cut off in the event of an engine fire.

CAUTION : THE HYDRAULIC SYSTEMS MUST NOT, UNDER ANY CIRCUMSTANCES, BE PRESSURIZED BY A HYDRAULIC GROUND POWER UNIT DURING THESE TESTS.

2. Operational Test

Check for correct operation of the shut-off valves.

A. Equipment and Materials

DESCRIPTION	PART NO.
Electrical Ground Power Unit	

R B. Prepare

(1) Make certain that the following circuit breakers are set :

Engine 3 Blue system shut-off valve :

SERVICE	PANEL	CIRCUIT BREAKER		MAP REF.
ENG 3 SHUT OFF VALVES CONT	4-213	W	4	D10
SHUT OFF VALVES IND	15-216	W	6	C19

Engine 4 Blue system shut-off valve :

SERVICE	PANEL	CIRCUIT BREAKER		MAP REF.
ENG 4 SHUT OFF VALVES CONT	4-213	W	8	C10
SHUT OFF VALVES IND	15-216	W	6	C19

(2) Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing).

C. Test

(1) On Flight Engineer's HYDRAULIC MANAGEMENT panel, place BLUE switches 3 and 4 in SHUT position. SHUT-OFF VALVES-BLUE 3 and 4 magnetic indicators must be cross-hatched throughout transit of valves, and then display SHUT.

(2) On Flight Engineer's HYDRAULIC MANAGEMENT panel, place BLUE switches 3 and 4 in ON position. SHUT-OFF-VALVES-BLUE 3 and 4 magnetic indicators must be crosshatched throughout transit of the valves, and then display OPEN.

D. Close-Up

De-energize aircraft electrical network, and disconnect the electrical ground power unit (Ref. 24-41-00, Servicing).

3. Functional Test

Check for correct operating condition of shut-off valves.

A. Equipment and Materials

DESCRIPTION	PART NO.
Electrical Ground Power Unit	
Access Platform 13 ft.7 in. (4.06 metres)	
Wing Protective Mats	

R B. Prepare

(1) Make certain that the following circuit breakers are set :

Engine 3 Blue system shut-off valve :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
ENG 3 SHUT OFF VALVES CONT	4-213	W 4	D10
SHUT OFF VALVES IND	15-216	W 6	C19

Engine 4 Blue system shut-off valve :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
ENG 4 SHUT OFF VALVES CONT	4-213	W 8	C10
SHUT OFF VALVES IND	15-216	W 6	C19

(2) Connect electrical ground power unit, and energize the aircraft electrical network (Ref. 24-41-00, Servicing).

(3) Open access doors 631BT, 632CT and 632DT.

(4) On ENGINE FIRE CONTROLS overhead panel, make certain that fire control handles are in normal position (pushed in).

C. Test

(1) On Flight Engineer's HYDRAULIC MANAGEMENT panel, place BLUE switches 3 and 4 in SHUT position. SHUT-OFF VALVES - BLUE 3 and 4 magnetic indicators must be crosshatched throughout transit of the valves, and then display SHUT when the valves close.

R In zones 631 and 632 the shut-off valves must close, and this condition must be indicated by their mechanical indicators.

(2) On Flight Engineer's HYDRAULIC MANAGEMENT panel, place BLUE switches 3 and 4 in OFF position.
SHUT-OFF VALVES - BLUE 3 and 4 magnetic indicators must be crosshatched throughout transit of the valves, and then display OPEN when valves open.
R In zones 631 and 632, the shut-off valves must open, and this condition must be indicated by their mechanical indicators.

(3) On Flight Engineer's HYDRAULIC MANAGEMENT panel, place BLUE switches 3 and 4 in ON position.
No change. The results are the same as in (2) above.

(4) On ENGINE FIRE CONTROLS overhead panel, pull out engines 3 and 4 ENGINE FIRE control handles.
On Flight Engineer's HYDRAULIC MANAGEMENT panel, SHUT OFF VALVES - BLUE 3 and 4 magnetic indicators must be crosshatched throughout transit of the valves and then display SHUT when the valves close.
R In zones 631 and 632 the shut-off valves must close and this condition must be indicated by their mechanical indicators.

(5) On ENGINE FIRE CONTROLS overhead panel, push in engines 3 and 4 ENGINE FIRE control handles.
On Flight Engineer's HYDRAULIC MANAGEMENT panel, SHUT OFF VALVES - BLUE 3 and 4 magnetic indicators must be crosshatched throughout transit of the valves, then display OPEN when the valves open.
R In zones 631 and 632 the shut-off valves must open and this condition must be indicated by their mechanical indicators.

D. Close-Up

(1) Close access doors.

(2) Remove wing protective mats and access platform.

(3) De-energize the aircraft electrical network and disconnect electrical ground power unit (Ref. 24-41-00, Servicing).

HYDRAULIC POWER ACCUMULATOR - REMOVAL/INSTALLATION

WARNING : MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE MAKE CERTAIN THAT THE TRAVEL RANGES OF THE ELEVONS ARE CLEAR.

1. General

Removal for replacement

R NOTE : If the accumulator is replaced due to insufficient pre-
R load Nitrogen pressure, the Hydraulic Tank De-Aerator
R Safety Valve is to be checked for clogging indication.

2. Accumulator

A. Equipment and Materials

DESCRIPTION	PART NO.
Blanking Plugs/Caps for Hydraulic lines	
Circuit Breaker Safety Clips	
Access Platform - 9 ft. 8 in (2.96 metres)	
Corrosion Resistant Steel Lockwire, Condition A, Dia. 0.032 in. (0.8 mm)	

B. Prepare

(1) Trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
HYD GRND CHECK OUT SEL VALVE CONT	15-216	M 626	F22
HYD TANK COMPR CONT	15-215	M 602	D 8

(2) Open access door 153AB under fuselage, and depressurize Blue system tank by opening associated depressuzation valve.

(3) Open access door 151DB under fuselage, and depressurize Blue system by actuating control lever of associated pressure relief and manual unloading valve.

(4) Close tank depressurization valve and secure with safety pin.

C. Remove

(1) Slowly release accumulator nitrogen pressure.

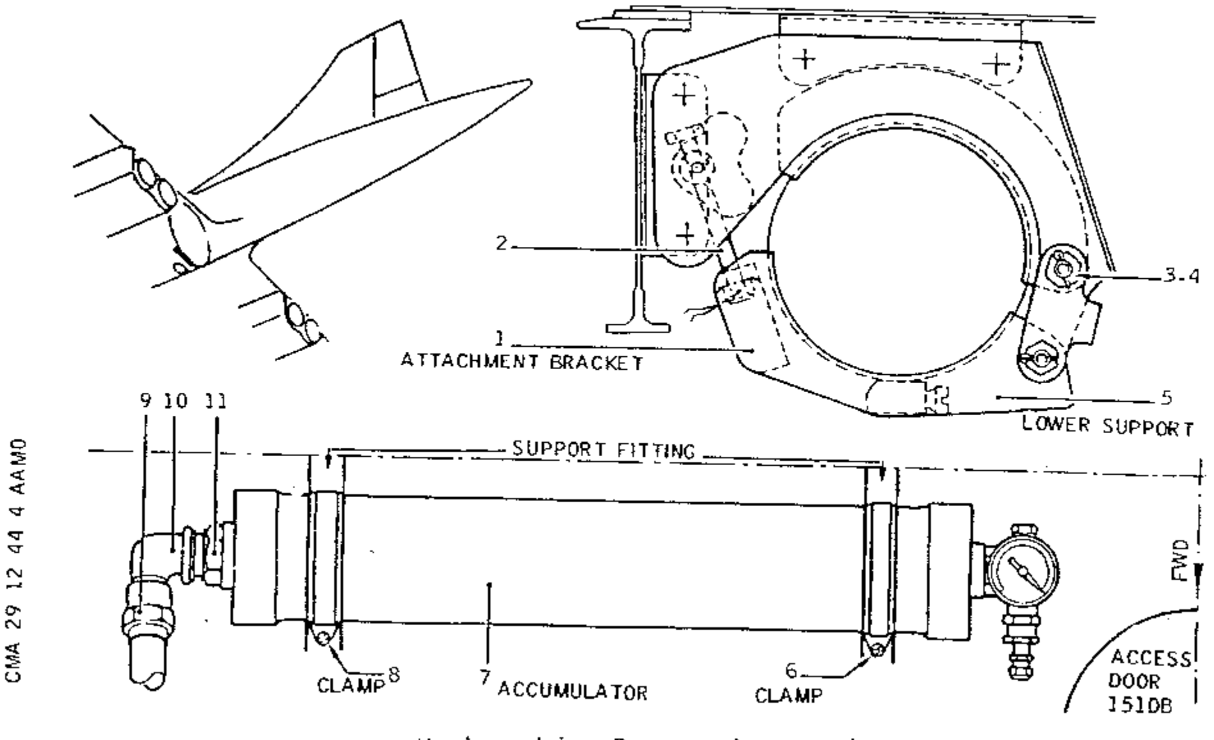
(2) Unscrew coupling nut (9) and cap open ends of line and of accumulator elbow.

(3) Remove clamps (6) (8).

(4) Cut and remove lockwire and loosen screws (2).

(5) Support accumulator (7), remove screws (2) from attachment bracket (1).

(6) Pivot lower support (5) about pins (3) and (4).



Hydraulic Power Accumulator
Figure 401

(7) Remove accumulator (7).

D. Preparation of Replacement Component

(1) Remove elbow (10) from removed accumulator.

(2) Replace O-ring and install elbow (10) on replacement accumulator.

(3) Correctly position elbow (10) and tighten nut (11).

E. Install

(1) Install and correctly position accumulator (7) on support fittings.

(2) Place lower supports (5) around the accumulator and insert screws (2) into attachment brackets (1).

(3) Tighten screws (2) and wirelock.

(4) Install clamps (6) and (8) and tighten.

(5) Tighten nut (9) on elbow (10).

(6) Charge accumulator with nitrogen (Ref. 29-00-00, Servicing).

(7) Replenish tank as required (Ref. 12-12-29).

F. Test

Check installation for leakage when pressurizing the system.

G. Close-Up

(1) Make certain that the working area is clean and clear of tools and miscellaneous items of equipment.

(2) Clean the accumulator and adjacent area and make certain that no trace of hydraulic fluid remains.

(3) Close access doors.

(4) Remove access platform.

(5) Re-set circuit breakers.

HYDRAULIC FLUID/FUEL DOUBLE HEAT EXCHANGER - REMOVAL/INSTALLATION

CAUTION : MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE, MAKE CERTAIN THAT THE TRAVEL RANGES OF THE ELEVONS ARE CLEAR.

1. General

The double heat exchanger is located in the upper part of the wing and is accessible through access door 632CT.

2. Hydraulic Fluid/Fuel Double Heat Exchanger

A. Equipment and Materials

DESCRIPTION	PART NO.
Electrical Ground Power Unit	
Drainage Equipment - Hydraulic Fluid, by Suction Line Self-Sealing Coupling	D921595000
Blanking Plugs/Caps for Hydraulic Fluid and Fuel Lines	
Wing Protective Mats	
Access Platform - 13 ft.7 in. (4.06 m)	
Container for Recovery of Hydraulic Fluid : Capacity 15 litres (3.70 US Gal, 3.30 Imp. Gal)	
Container for Recovery of Fuel	
Hydraulic Fluid (Ref. 20-30-00, No.011)	
Corrosion-Resistant Steel Lockwire, R Condition 'A', Dia. 0.020 in. (0.5mm)	
Corrosion-Resistant Steel Lockwire, R Condition 'A', Dia. 0.032 in. (0.8mm)	

R

B. Prepare

(1) Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing)

(2) Open access doors 632CT and 632AT.

(3) On Flight Engineer's HYDRAULIC MANAGEMENT panel, make certain that SHUT-OFF VALVES - BLUE 4 and YELLOW 4 magnetic indicators display OPEN.

(4) On FUEL MANAGEMENT panel, make certain by means of LP VALVE magnetic indicator (engine 4) that associated fuel shut-off valve is closed.

(5) De-energize aircraft electrical network (Ref. 24-41-00, Servicing).

(6) Trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER		MAP REF.
ENG 4 SHUT OFF VALVES CONT	4-213	W	8	C10
LP VALVE SUP 1	15-216	4Q	1	C 2
SHUT OFF VALVES IND		W	6	C19

(7) Open panel 446AB on engine 4 (Ref. 71-00-00, Servicing)

(8) Remove drain plug under engine fuel feed filter and drain fuel into container provided.

(9) Unscrew bleed plugs on recirculation valves.

(10) Open access door 153BB under fuselage and depressurize Blue and Yellow system tanks by opening associated depressurization valves.

(11) Open access door 151DB under fuselage and depressurize Blue and Yellow systems by actuating control lever of associated pressure relief and manual unloading valves.

(12) Remove engine 4 Blue and Yellow system shut-off valve blanking plugs and open bleed valves.

(13) Disconnect suction lines of Blue and Yellow pumps at self-sealing couplings.

(14) Connect hydraulic fluid drainage equipment and drain

pump suction lines into container provided.

(15) Close bleed valves on hydraulic shut-off valves.

C. Remove

(1) Remove air/fuel heat exchanger fuel supply line :

(a) Cut and remove lockwire and remove screws (7) attaching adaptor (5). Remove bonding strip.

(b) Remove flange attachment screws at other end of line.

(c) Remove line.

(2) Remove fuel Y-line :

(a) Straighten safety tabs and remove attaching screws (13).

(b) Remove bonding strip.

(c) Loosen engine feed line coupling nut.

(d) Loosen air/fuel heat exchanger return line coupling nut.

(e) Remove Y-line.

(3) Remove air/fuel heat-exchanger fuel return line :

(a) Disconnect bonding strip.

(b) Loosen coupling nut.

(c) Remove line.

(4) Disconnect heat exchanger outlet hydraulic lines :

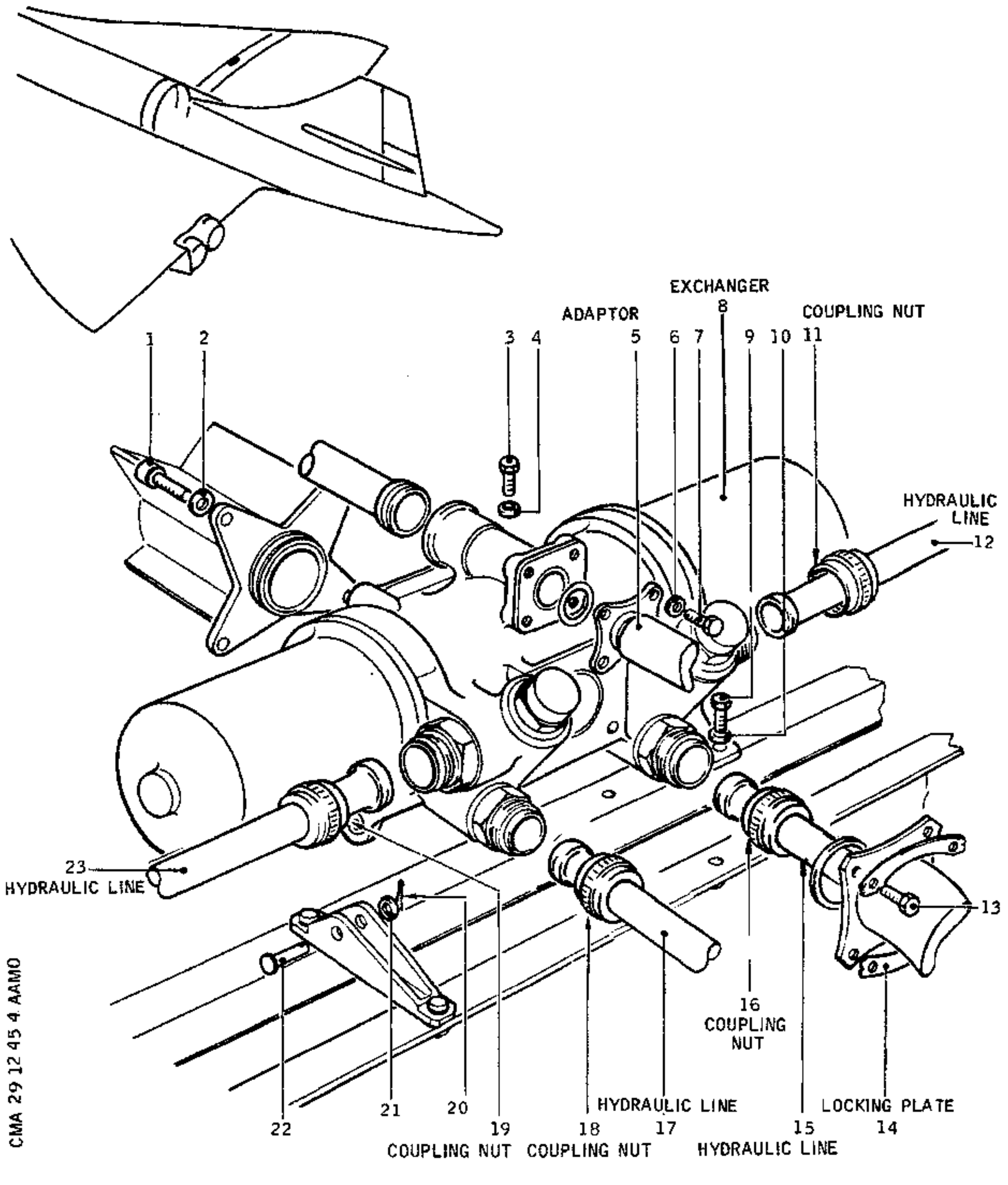
(a) Remove from their supports clamps attaching lines (15) and (17).

(b) Loosen coupling nuts (16) and (18).

(5) Disconnect heat exchanger inlet hydraulic lines :

(a) Remove from their brackets clamps attaching lines (12) and (23).

(b) Loosen coupling nuts (11) and (19).



Double Heat Exchanger
Figure 401

(6) Cut and remove lockwire and remove attaching screws (1). Remove and retain washers (2).

(7) Remove heat exchanger :

(a) Remove attaching screws (3) and (9).

(b) Remove split pin (20), clevis pin (22) and washer (21).

(c) Remove heat exchanger (8) from its mounting.

(d) Cap open ends of lines remaining in position.

D. Preparation of Replacement Component

E. Install

NOTE : The seals must be lubricated with Product No.011.

(1) Install heat exchanger :

(a) Remove caps from fuel inlet by-pass lines.

(b) Position heat exchanger (8) on its mounting and push home.

(c) Install attaching screws (3) and (9) and washers (4) and (10).

(d) Insert clevis pin (22), install washer (21) and safety with split pin (20).

(e) Tighten attaching screws (3) and (9).

(f) Install screws (1) with washers (2). Tighten home and wirelock. Do not omit bonding strip.

(2) Connect heat exchanger inlet hydraulic lines (12) and (23) :

(a) Remove blanking caps and replace seals.

(b) Install lines (12) and (23) and tighten coupling nuts (11) and (19).

(c) Install attaching clamps for lines (12) and (23) on their supports.

(3) Connect heat exchanger outlet hydraulic lines (15) and (17) :

(a) Remove blanking caps and replace seals.

(b) Install lines (15) and (17) and tighten coupling nuts (16) and (18).

(c) Install line attaching clamps on their supports

(4) Install air/fuel heat exchanger fuel return line :

(a) Remove blanking caps and replace seals.

(b) Tighten coupling nut on air/fuel heat exchanger side.

(c) Attach bonding strip.

(5) Install fuel Y-line :

(a) Replace seals and position Y-line on heat exchanger.

(b) Install locking plate (14) and attaching screws (13).

(c) Tighten screws (13) and fold over tabs of locking plate (14).

(d) Tighten coupling nut on engine feed side.

(e) Attach bonding strip.

(f) Tighten coupling nut on air/fuel heat exchanger return.

(6) Install air/fuel heat exchanger fuel supply line :

(a) Install adaptor (5) on line.

(b) Position line.

(c) Attach adaptor to heat exchanger with screws (7), washers (6). Tighten screws and wirelock. Do not omit bonding strip.

(d) Install attaching screws on the opposite side.

(e) Attach bonding strip.

(7) Remove hydraulic fluid drainage equipment.

(8) Connect hydraulic pump suction lines.

(9) Close and wirelock fuel drain plugs.

(10) Close and wirelock fuel air vent plug.

(11) Close Blue and Yellow tank depressurization valves and secure with safety pins.

(12) Bleed suction lines of pumps (Ref. 29-12-00, and 29-21-00, Servicing).

(13) Fully tighten and wet torque shut-off valve bleed valves with Product No.011 to between 35 and 49 lbf in (0.40 and 0.55 mdaN). Wirelock.

(14) Cap bleed valve and wirelock cap.

(15) Replenish hydraulic tanks as required (Ref. 12-12-29).

F. Test

RB Check for external leakage on the installation during an
RB engine dry cycle, ensuring that the hydraulic systems are
RB pressurized and the fuel system is at nominal pressure -
RB collector tank feed pumps ON and LP isolation valve OPEN.

G. Close-Up

(1) Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(2) Clean heat exchanger and adjacent area and make certain that no trace of hydraulic fluid remains.

(3) Remove safety clips and tags and reset circuit breakers.

(4) Close engine panel.

(5) Disconnect and remove electrical ground power unit (Ref. 24-41-00, Servicing).

(6) Close access doors.

(7) Remove wing protective mat.

(8) Remove access platform.

PRINTED IN ENGLAND

SAMPLING VALVE - REMOVAL/INSTALLATION

1. General

The sampling valve is located in the upper RH part of zone 151.

2. Sampling Valve

A. Equipment and Materials

DESCRIPTION	PART NO.
Container for Recovery of Hydraulic Fluid	
Corrosion-Resistant Steel Lockwire, Dia. 0.032 in. (0.8 mm)	
Access Platform	
Blanking Plugs/Caps	

B. Prepare

(1) Open access door 151DB and depressurize Blue system (Ref. 29-12-00, Servicing).

(2) Open access door 153BB, and depressurize Blue system tank (Ref. 29-13-00, Servicing).

(3) Trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
HYD GRND CHECK OUT SEL VALVE CONT	15-216	M 626	F22
HYD TANK COMPR CONT	15-215	M 602	D 8

(4) Display a warning notice on engine 3 prohibiting pressurization of Blue hydraulic system.
Display a warning notice at Flight Engineer's station prohibiting use of ground pressurizing system electric pumps.
If a hydraulic ground power unit is connected to the

aircraft, display a warning notice on the unit prohibiting pressurization of the aircraft hydraulic system.

C. Remove

(1) Cut and remove lockwire.

(2) Remove sampling valve (1) from union (3).

(3) Plug/cap open ports of union and sampling valve.

D. Preparation of Replacement Component

R (1) Cut and remove lockwire, remove cap (4) from sampling valve.

(2) Check that valve is closed.

(3) Install cap on valve, moderately tighten by hand, and wirelock (Ref. 20-21-13).

E. Install

(1) Remove blanking plugs/caps.

(2) Place O-ring gasket (2) on sampling valve (1).

(3) Install sampling valve (1) in union (3).
Torque to 7.9 ± 0.05 m.daN (58.26 ± 0.36 lbf.ft.).

R (4) Wirelock sampling valve (1) (Ref. 20-21-13).

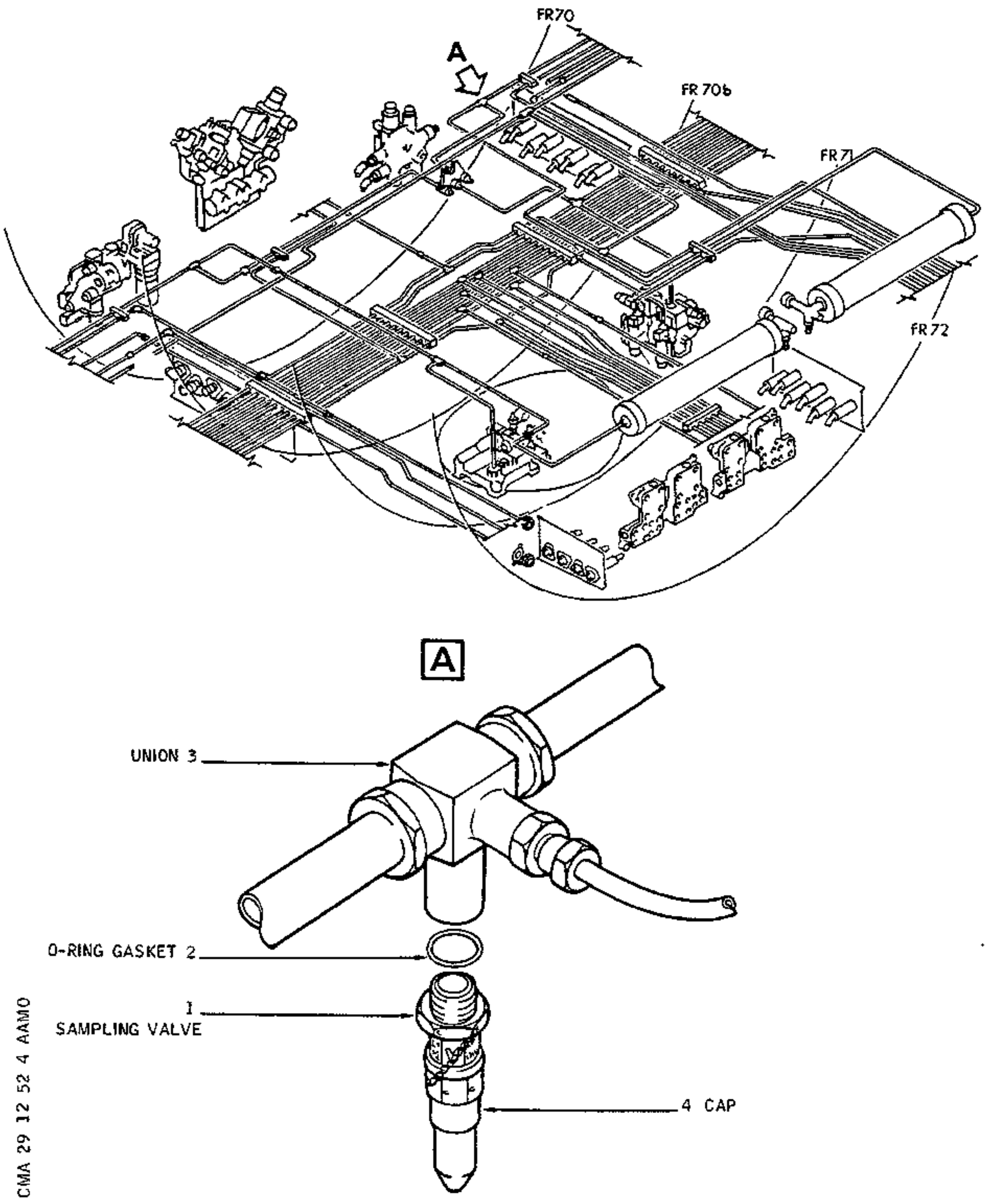
(5) Remove safety clips and tags and reset the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
HYD GRND CHECK OUT SEL VALVE CONT	15-216	M 626	F22
HYD TANK COMPR CONT	15-215	M 602	D 8

(6) Remove warning notices.

F. Test

(1) Pressurize Blue hydraulic system (Ref. 29-12-00,



Sampling Valve
Figure 401

R

Servicing).

(2) Check sampling valve for leakage.

(3) Shut down hydraulic power source (Ref. 29-12-00, Servicing).

G. Close-Up

(1) Clean the sampling valve and adjacent area, and make certain that no trace of hydraulic fluid remains.

(2) Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(3) Close access doors 151DB, 153BB.

(4) Remove access platforms.

HYDRAULIC TANK ASSEMBLY - REMOVAL/INSTALLATION

CAUTION : MAKE CERTAIN THAT THE LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE MAKE CERTAIN THAT THE TRAVEL RANGES OF THE ELEVONS ARE CLEAR.

1. General

The Blue system hydraulic tank is located in zone 153 and is accessible through door 153BB.

This topic describes the removal/installation procedure for :
- The complete tank assembly
- The removable electric sub-assembly of the quantity transmitter/direct reading indicator assembly.

2. Tank Assembly - Hydraulic

A. Equipment and Materials

DESCRIPTION	PART NO.
Drain Hose - Hydraulic Tanks	D925190000
Blanking Plugs/Caps for Hydraulic Lines	
Access Platform - 9 ft.8 in (2.96 metres)	
Container	
Circuit Breaker Safety Clips	

R B. Prepare

(1) Open access door 153BB under fuselage and depressurize Blue system tank.

(2) Open access door 151DB under fuselage and depressurize Blue system by actuating control lever of associated pressure relief and manual unloading valve.

(3) Trip, safety and tag the following circuit breakers :

Printed in England

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
BLUE TANK CONTENTS IND	13-215	D 43	F 8
HYD GRND CHECK OUT SEL VALVE CONT	15-216	M626	F22
HYD TANK COMPR CONT	15-215	M602	D 8
BLUE GRN LL LP O/HEAT	15-216	G262	D19
R **ON A/C 001-006 HYD FLUID TEMP IND	15-215	D220	D 9

(4) Drain Tank

(a) Remove the two plugs from unions (2) and (3) on drain cock (6).

(b) Connect tank drain hose to union (2).

(c) Loosen set screw inside union (3) and allow fluid to drain into container provided until tank is completely drained.

(d) Disconnect tank drain hose of union (2).

(e) Tighten the set screw inside union (3) and install the two plugs on unions (2) and (3) of drain cock (6).

C. Remove

(1) Disconnect the electrical connectors from tank.

(2) Mark and then remove clamps securing hydraulic lines on tank.

(3) Remove all lines connected to tank. Cap open line ends and tank ports. Uncouple attaching straps (4) and (5). Remove tank (1).

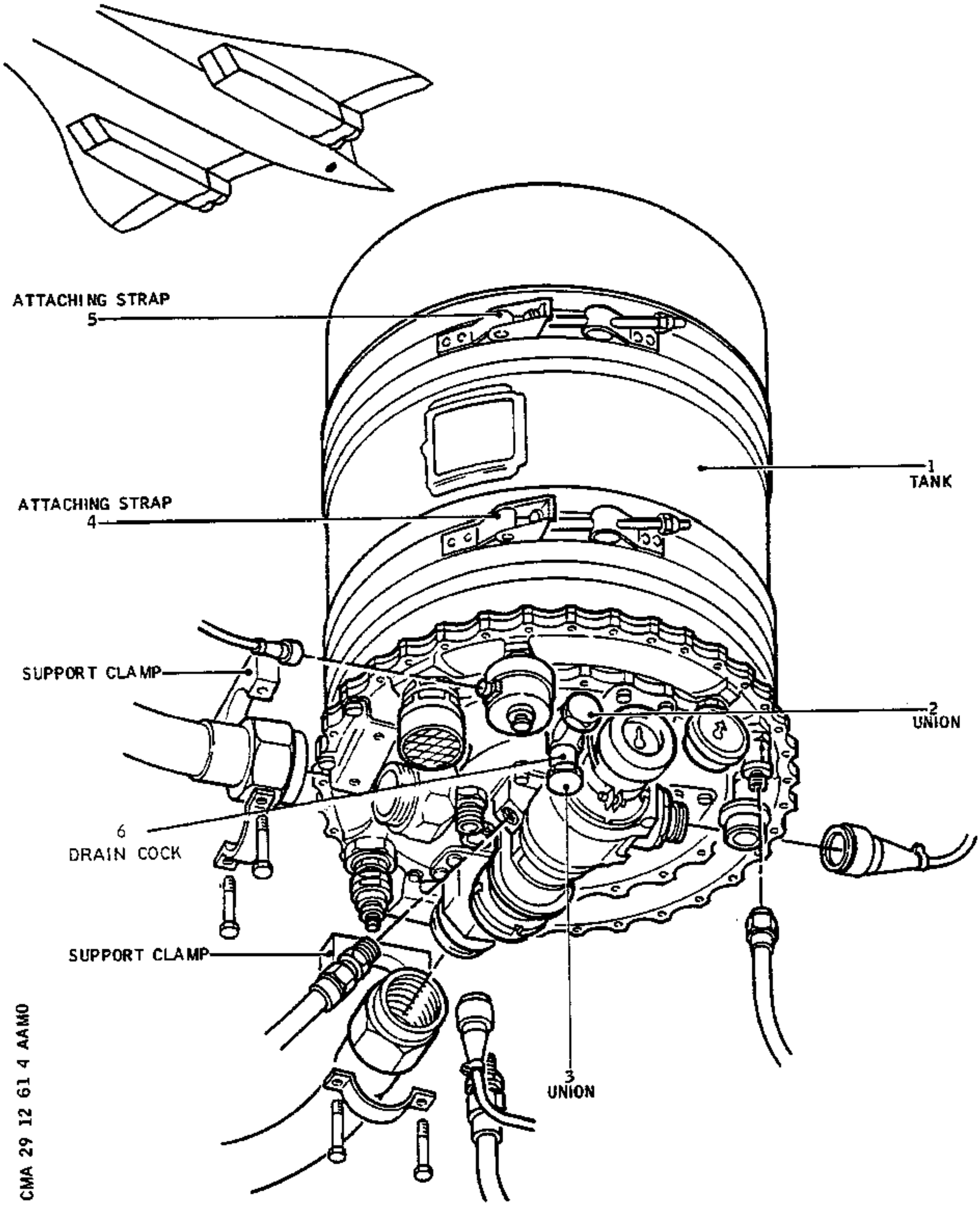
D. Preparation of Replacement Component

(1) Check that replacement unit is filled with product No.11 (Ref. 20-30-00).

E. Install

(1) Drain replacement tank.

PRINTED IN ENGLAND



Hydraulic Tank Assembly
Figure 401

(2) Position tank and attach it to its supports by means of straps (4) and (5). Do not tighten.

(3) Connect electrical connectors to tank.

(4) Remove blanking caps.

(5) Position and connect hydraulic lines but do not tighten.

(6) Install line support clamps.

(7) Fully secure tank by tightening straps (4) and (5).

(8) Tighten all hydraulic lines.

(9) Tighten line support clamps.

R WARNING: IF TANK HAS BEEN DRAINED THROUGH DRAIN COCK, TIGHTEN
R THE SET SCREW AND INSTALL THE TWO PLUGS.

(10) Replenish tank (Ref. 12-12-29).

R F. Tests

(1) Functional Test (Ref. 29-32-00 and 29-33-00, Adjustment/Test).

(2) After tests, check for external leakage on lines.

R G. Close-up

(1) Remove safety clips and tags and reset circuit breakers.

(2) Make certain that working area is clear of tools and miscellaneous items of equipment.

(3) Clean hydraulic tank and adjacent area and make certain that no trace of hydraulic fluid remains.

(4) Close access doors.

(5) Remove access platform.

3. Electric Sub-Assembly - Quantity Transmitter/Direct Reading Indicator

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform 9 ft. 8 in. (2.96 m)	
Circuit Breaker Safety Clips	

R

B. Prepare

(1) Open access door 153BB under fuselage.

(2) Trip, safety and tag the following circuit breaker :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
BLUE TANK CONTENTS IND	13-215	D 43	F 8

C. Remove

(1) Disconnect electrical connector (2).

(2) Loosen attaching screw on clamp (1), disengage clamp from bracket (5).

(3) Loosen attaching screw on clamp (4) disengage clamp from mating flanges of hydraulic sub-assembly (6) and electric sub-assembly (3).

(4) Remove electric sub-assembly (3), remove and retain clamps (1) and (4).

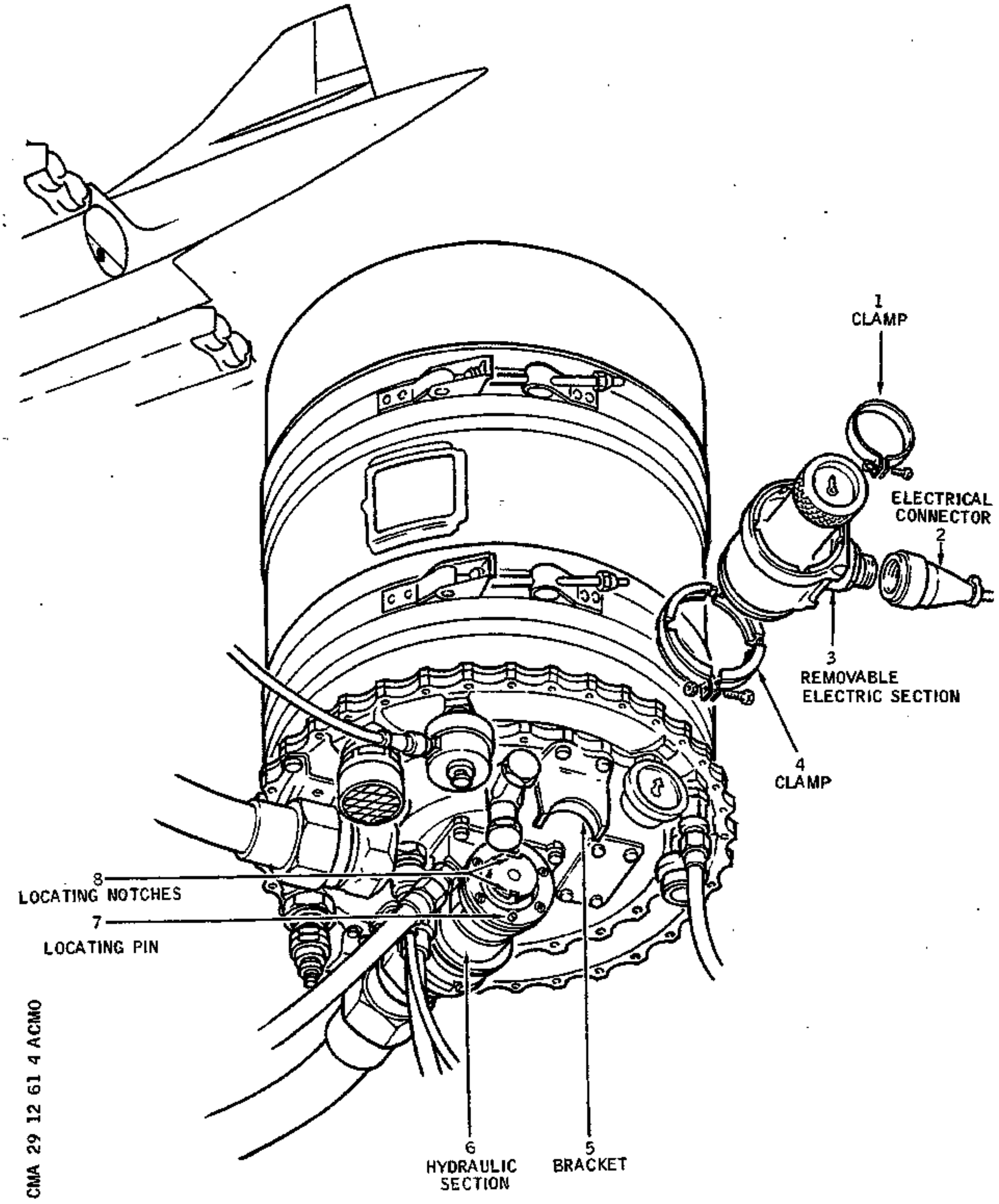
D. Preparation of Replacement Component

NOTE : It is essential to use electric and hydraulic sub-assemblies intended for the Blue tank.

E. Install

(1) Position removable electric sub-assembly (3) on fixed hydraulic sub-assembly (6).

NOTE : Locating pin (7) on mating flange of hydraulic



Removable Electric Sub-Assembly of Tank Quantity
Transmitter/Direct Reading Indicator Assembly
Figure 402

R

sub-assembly, and locating notches (8) on movable drive parts, ensure foolproof installation of electric sub-assembly on hydraulic sub-assembly.

(2) Install clamp (4) and fully tighten attaching screw.

(3) Install clamp (1) and fully tighten attaching screw.

(4) Connect electrical connector (2).

(5) Remove safety clip and tag and reset circuit breaker D43.

F. Test

Perform a functional test (Ref. 29-32-00, Adjustment/Test).

G. Close-Up

(1) Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(2) Close all access doors.

(3) Remove access platform.

LP FILTER (RESERVOIR RETURN) - REMOVAL/INSTALLATION

WARNING : MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE, MAKE CERTAIN THAT THE TRAVEL RANGES OF THE ELEVONS ARE CLEAR.

1. General

   A. Removal for Replacement

2. LP Filter

   A. Equipment and Materials

DESCRIPTION	PART NO.
Drain Hose-Hydraulic Tanks	D925190000
Container	
Blanking Plugs/Caps for Hydraulic Lines	
Access Platform - 9 ft. 8 in. (2.96 metres)	
Reservoir Pressurizing Equipment (Air Bottle With Pressure Reducing Valve)	
Air/Hydraulic Tool Kit	
Circuit Breaker Safety Clips	
Drainage Equipment - LP Filter - Hydraulic Reservoir	D921596000

   B. Prepare

      (1) Open access door 153BB under fuselage and depressurize Blue system reservoir by opening associated depressurization valve.

      (2) Open access door 151DB under fuselage and depressurize Blue system by actuating control lever of associated pressure relief and manual unloading valve.

(3) Connect reservoir pressurizing equipment to ground connector (0191) zone 153.

(4) Trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
HYD TANK COMPR CONT	15-215	M 602	D 8
HYD GRND CHECK OUT SEL VALVE CONT	15-216	M 626	F22

C. Remove

(1) Partially drain Blue system reservoir :

(a) Remove the two plugs from reservoir drain valve.

(b) Connect reservoir drain hose to valve.

(c) Loosen drain valve set screw and allow fluid to drain into container provided.

CAUTION : DO NOT DRAIN THE RESERVOIR COMPLETELY OR THE BELLOWS, MADE OF JOINED SEGMENTS, MAY BE DAMAGED.

(2) Drain filter (1).

(a) Remove lock pin (4).

(b) Connect reservoir LP filter drainage equipment to knurled knob (5).

(c) Loosen knurled knob, and allow fluid to flow until filter is completely drained.

(3) Remove nuts (10) from links (6), remove screws and washers. Remove and retain clamp (9) and the two half-shells (8). Unscrew union nut (7).

(4) Disconnect all lines attached to filter.

(5) Remove split pins and nuts (2) from bolts (3) which attach filter to mountings.

(6) Support filter and remove bolts (3). Remove and retain shims.

(7) Raise filter slightly, disconnect line connecting filter to reservoir, remove filter.

(8) Cap all open line ends.

D. Preparation of Replacement Component

E. Install

(1) Remove blanking caps from hydraulic lines.

(2) Position filter on its mounting, connect line between filter and reservoir.

(3) Position filter using shims which are inserted between filter attachment lugs and those on the mounting.

NOTE : The thickness of the shims between each attachment lug must not exceed 0.016 in. (0.41 mm).

(4) Secure filter to its mounting with bolts (3), washers and nuts (2). Safety nuts with split pins.

(5) Connect lines to filter.

(6) Install the two half-shells (8), clamp (9) and links (6).

(7) Replenish reservoir (Ref. 12-12-29).

(8) Close and wirelock reservoir depressurization valve.

(9) Pressurize reservoirs to 4.8 bars (70 psi) using pressurizing equipment.

(10) Check for absence of external leakage on lines and filter.

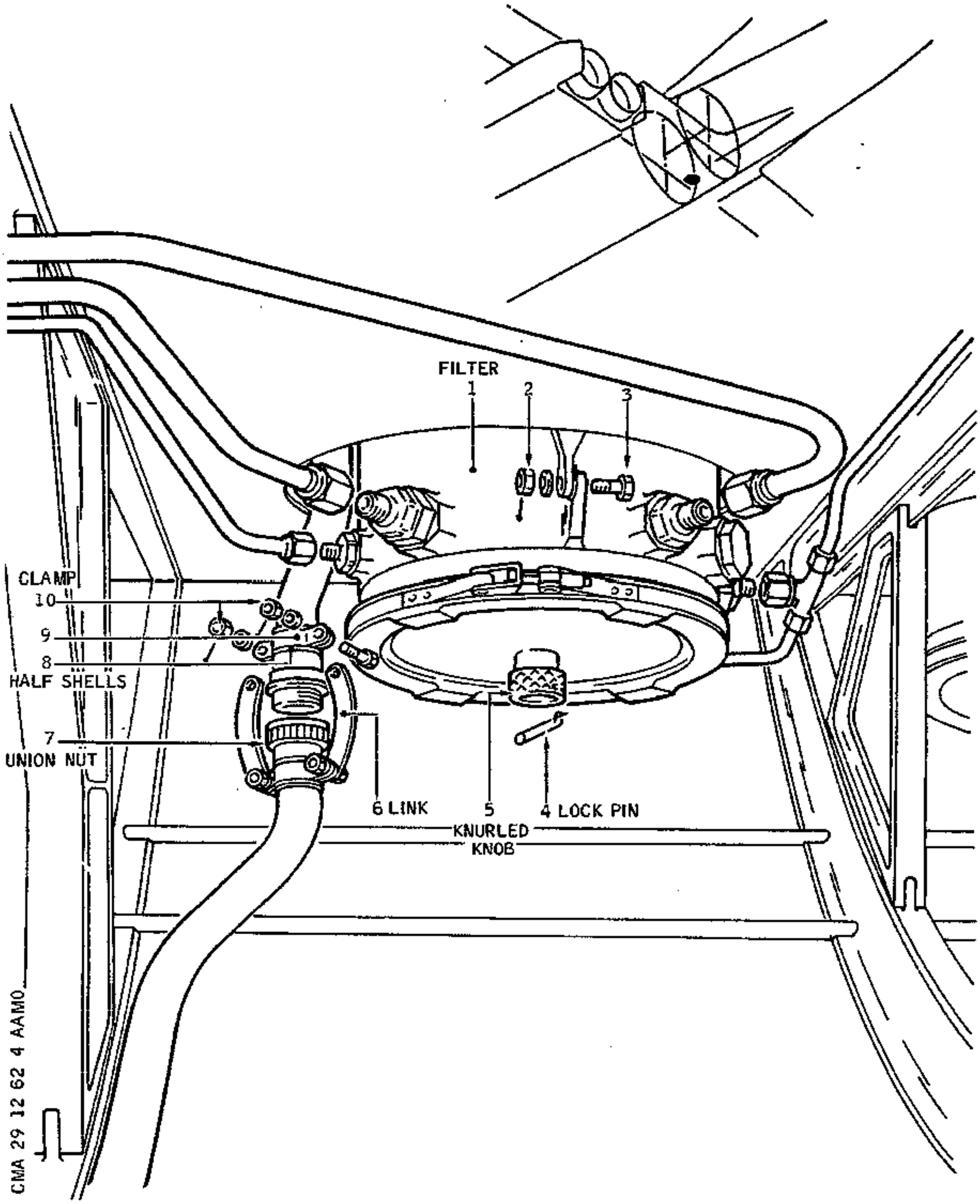
F. Test

G. Close-Up

(1) Clean filter and adjacent area and make certain that no trace of hydraulic fluid remains.

(2) Make certain working area is clean and clear of miscellaneous items of equipment.

(3) Disconnect pressurizing equipment.



LP Filter (Reservoir Return)
Figure 401

(4) Close access doors.

(5) Remove access platform.

(6) Remove safety clips and tags, reset circuit breakers.

PRINTED IN ENGLAND

ENGINE-DRIVEN HYDRAULIC PUMP - REMOVAL/INSTALLATION

WARNING: MAKE CERTAIN THAT THE POSITIONS OF NOSE AND MAIN GEAR DOORS CORRESPOND WITH THE ACTUAL POSITIONS OF THE RESPECTIVE OPERATING HANDLES.
HANDLE LOCKED, INDICATOR PLATE SHOWING WHITE : DOORS CLOSED.
HANDLE LOCKED, INDICATOR PLATE SHOWING RED : DOORS OPEN.

MAKE CERTAIN THAT THE LANDING GEAR POSITION INDICATED ON THE GEARS POSITION INDICATING UNIT CORRESPONDS WITH THE ACTUAL POSITION OF THE LANDING GEAR.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE, MAKE CERTAIN THAT THE TRAVEL RANGES OF THE CONTROL SURFACES ARE CLEAR.

BEFORE PRESSURIZING HYDRAULIC SYSTEMS, CHECK THAT ALL CONTROLS ARE SET TO CORRESPOND WITH THE ACTUAL POSITION OF THE SERVICES THEY OPERATE.

MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

1. General

This topic details the removal/installation procedure for the engine-driven hydraulic pumps and for the pump drive shafts.

R The procedure applies to both engine-driven pumps in the Blue system.

RB CAUTION: WHEN REPLACING THE PUMP FOR ANY REASON THE CASE DRAIN
RB FILTER ELEMENT MUST ALSO BE CHANGED. THIS MUST BE
RB DONE BEFORE THE REPLACEMENT PUMP IS OPERATED. REFER
RB TO 29-00-00, GENERAL SERVICING, PARAGRAPHS 2 AND 3,
RB FILTER ELEMENTS.

2. Pumps - Engine-Driven Hydraulic

A. Equipment and Materials

DESCRIPTION	PART NO.
Special products (Ref. 20-30-00, No.118)	-
Corrosion-resistant steel lockwire Dia. 0.028 in (0.7 mm)	-

DESCRIPTION	PART NO.
Oils (Ref. 20-30-00, No.021)	-
Electrical ground power unit	-
Mobile access platform for under nacelle, 5 ft 11 in (1.8 m)	-
Blanking plug/caps for hydraulic unions	-
Hydraulic fluid (Ref.20-30-00, No.011)	-
Container for recovery of hydraulic fluid	-

PRINTED IN ENGLAND

B. Prepare

(1) Open panel 435AB for pump mounted on engine 3 or panel 446AB for pump mounted on engine 4 (Ref. 71-00-00, Servicing).

R (2) Depressurize Blue system (Ref. 29-12-00, Servicing).
R Depressurize Blue hydraulic tank (Ref. 29-13-00, Servicing).

(3) Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing).

(4) Make certain that the following circuit breakers are set:

	SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
	ENG 4 SHUT OFF VALVES CONT	4-213	W 08	C10
R	ENG 3 SHUT OFF VALVES CONT		W 04	D10
	SHUT OFF VALVES IND	15-216	W 06	C19

PRINTED IN ENGLAND

(5) On Flight Engineer's HYDRAULIC MANAGEMENT panel, place control switch of pump to be removed in SHUT position. Check that associated SHUT OFF VALVES magnetic indicator, located on same panel, displays SHUT.

(6) Trip, safety and tag the following circuit breakers:

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
Engine No.3 Pump			
ENG 3 SHUT OFF VALVES CONT	4-213	W 04	D10
ENGINE 3 BLUE PUMP CONT IND	15-215	M 342	E 7
Engine No.4 Pump			
ENG 4 SHUT OFF VALVES CONT	4-213	W 08	C10
ENGINE 4 BLUE PUMP CONT IND	15-215	M 343	E 8

(7) Observe the following precautions:

WARNING: DISPLAY WARNING NOTICES ON ENGINE 1 PROHIBITING PRESSURIZATION OF YELLOW HYDRAULIC SYSTEM BY HYDRAULIC GROUND POWER UNIT.

DISPLAY A WARNING NOTICE AT FLIGHT ENGINEER'S STATION PROHIBITING USE OF GROUND PRESSURIZING SYSTEM ELECTRIC PUMPS

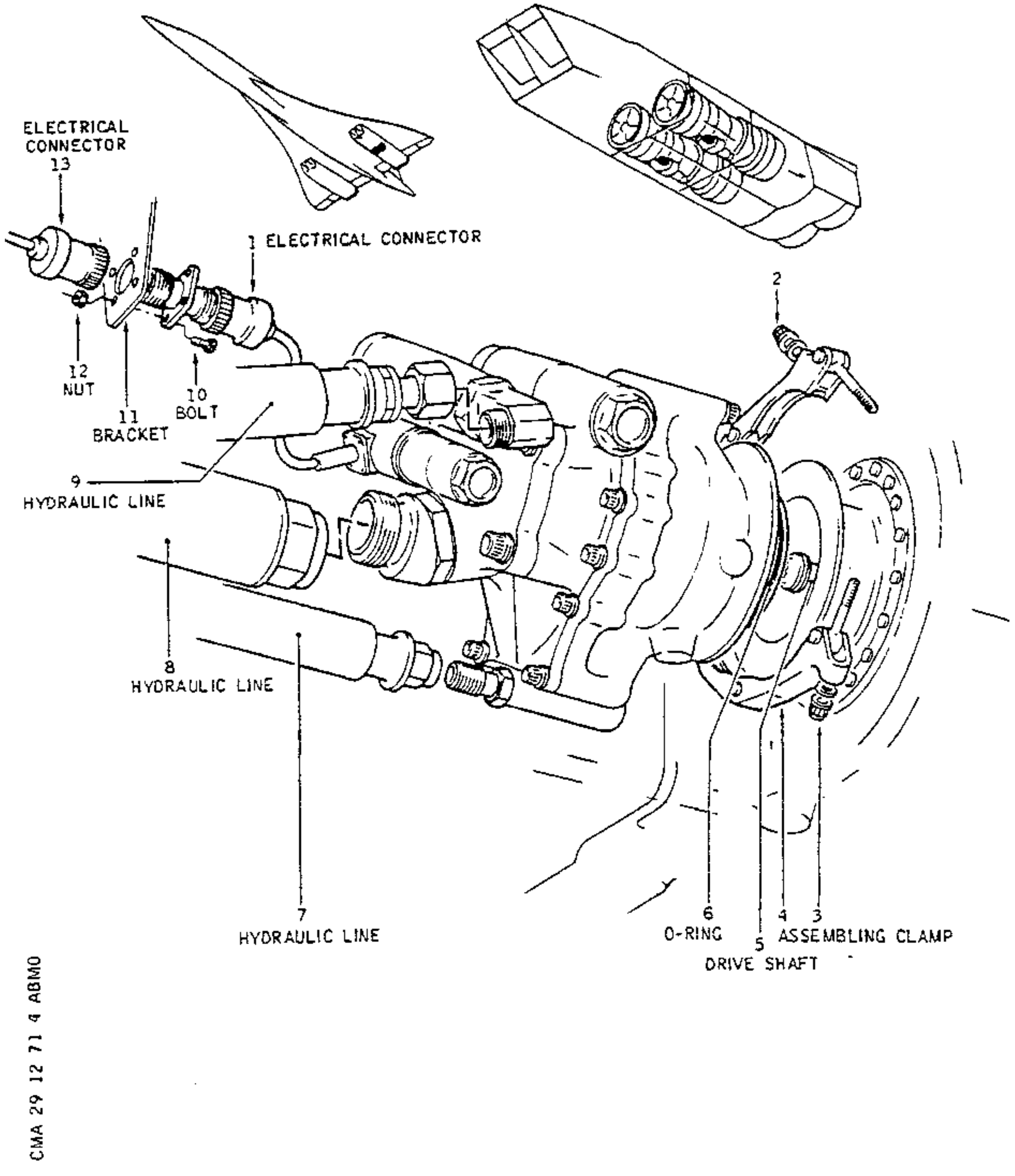
C. Remove
(Ref. Fig. 401)

**ON A/C 001-005,

(1) Disconnect lines (7), (8) and (9) from pump. Cap open ends of lines and of pump unions.

**ON A/C 006-007,

(1) Cut and remove lockwire, disconnect lines (7), (8) and (9) from pump. Cap open ends of lines and of pump unions.



R

Engine-Driven Hydraulic Pump
Figure 401

(2) Disconnect electrical connector.

(a) Cut and remove lockwire, disconnect electrical connector (13).

(b) Remove nuts (12) and bolts (10).

(c) Remove electrical connector (1) from bracket (11).

(3) Remove nuts (2) and (3), support pump and remove assembling clamp (4).

(4) Remove pump horizontally, so as not to damage splines of drive shaft (5).

(5) Retain assembling clamp (4) and check its condition.

D. Preparation of Replacement Component

RB (1) If no contamination is suspected change case drain
RB filter element. Refer to 29-00-00, General Servicing,
RB para. 3, Filter Elements.

RB (2) If contamination is suspected carry out flush. Change
RB pressure, case drain and low pressure filter elements.
RB Refer to 29-00-00, General Servicing, para. 2 and 3,
RB Filter Elements.

E. Install

(1) Check pump O-ring (6) for correct condition, replace if necessary and lubricate with Product No.118.

(2) Install pump, ensuring correct position on drive shaft and on mounting plate guide pin.

(3) Install assembling clamp:

(a) Make certain that tapered surfaces, threads of nuts and bolts, and mating surfaces of nuts, washers and spherical seatings are perfectly clean. Then apply a thin film of engine oil to the surfaces, enough to cover them. Wipe off any excess.

PRINTED IN ENGLAND

(b) Install assembling clamp (4) on flange, with spring washers under the nuts.

(c) Check rundown torque of nuts. It should be between 6 and 20 lbf in (0.065 to 0.457 mdaN).

(d) Tighten inner nut (2), torque to between 55 and 60 lbf in (0.62 and 0.68 mdaN). Using a leather mallet or fibre drift, tap each segment in turn to ensure even seating of the clamp.

(e) Re-torque inner nut (2) only, to 55 to 60 lbf in (0.62 to 0.68 mdaN) and again tap each segment in turn.

(f) Proceed with final torque tightening of inner nut (2) to between 55 and 60 lbf in (0.62 and 0.68 mdaN).

(g) Proceed with final torque tightening of outer nut (3) to between 55 and 60 lbf in (0.62 and 0.68 mdaN).

WARNING: WHEN THESE OPERATIONS HAVE BEEN CARRIED OUT THE TORQUE LOAD ON THE INNER NUT WILL HAVE BEEN REDUCED. DO NOT RETIGHTEN.

**ON A/C 001-005,

(4) Connect hydraulic lines (7), (8) and (9) to pump.

Torque as follows:
Line (7): 160 to 180 lbf in (1.808 to 2.034 mdaN)
Line (8): 450 to 500 lbf in (5.085 to 5.650 mdaN)
Line (9): 500 to 800 lbf in (5.65 to 9.04 mdaN)

**ON A/C 006-007,

(4) Connect hydraulic lines (7), (8) and (9) to pump.

Torque as follows:
Line (7): 160 to 180 lbf in (1.808 to 2.034 mdaN)
Line (8): 450 to 500 lbf in (5.085 to 5.650 mdaN)
Line (9): 500 to 800 lbf in (5.65 to 9.04 mdaN)
Wirelock (Ref. 20-21-13).

PRINTED IN ENGLAND

R
R

R

(5) Connect electrical connector

(a) Fit electrical connector (1) in bracket (11).

(b) Install and tighten bolts (10) and nuts (12).

(c) Connect electrical connector (13) to connector (1).

(d) Wirelock (Ref. 20-21-13).

B NOTE : Refer to MM chap 71-50-00
B Removal/Installation for connector
B tightening procedure.

(6) Remove safety clips and tags and reset circuit breakers tripped in preparation procedure.

(7) On Flight Engineer's HYDRAULIC MANAGEMENT panel, place control switch of installed pump in ON position. Check that SHUT OFF VALVES and PUMPS magnetic indicators located on same panel display OPEN and ON respectively.

(8) Bleed pump suction line (Ref. 29-12-00, Servicing).

(9) Replenish hydraulic tank as required (Ref. 12-12-29).

(10) De-energize aircraft electrical network and disconnect electrical ground power unit.

F. Test

(1) Check operation of pumps during ground running or motoring of associated engine (Ref. 71-00-00, Adjustment/Test). During ground running or motoring procedures :

(a) Make certain that Blue system pressure increases to rated value of 4000 psi (275 bars).

(b) Press pump L/PRESS caption light on Flight Engineer's HYDRAULIC MANAGEMENT panel. The pressure must drop, thus indicating that pump depressurization solenoid is operating correctly.

(2) After engine ground running or motoring procedures,

Printed in England

check installation for leakage.

G. Close-Up

(1) Clean the area adjacent to the pump and make certain that no trace of hydraulic fluid remains.

(2) Make certain that working area is clear of tools and miscellaneous items of equipment.

(3) Close access panels and doors.

(4) Remove access platform.

Printed in England

3. Shaft - Drive

A. Equipment and Materials

DESCRIPTION	PART NO.
Special Materials (Ref. 20-30-00, No.118).	
Oil (Ref. 20-30-00, No.021).	
Extractor - Quill Drive Shaft	E925099000

B. Prepare

(1) Remove engine-driven hydraulic pump (Ref. paragraph 2).

R
R
R

R

C. Remove
R (Ref. Fig. 402)

(1) Remove circlip (1).

(2) Remove drive shaft (2) using extractor E925099000.

NOTE : The extractor may also be used for removing a broken drive shaft.

D. Preparation of Replacement Component

(1) Lubricate O-ring (3) with Product No.118.

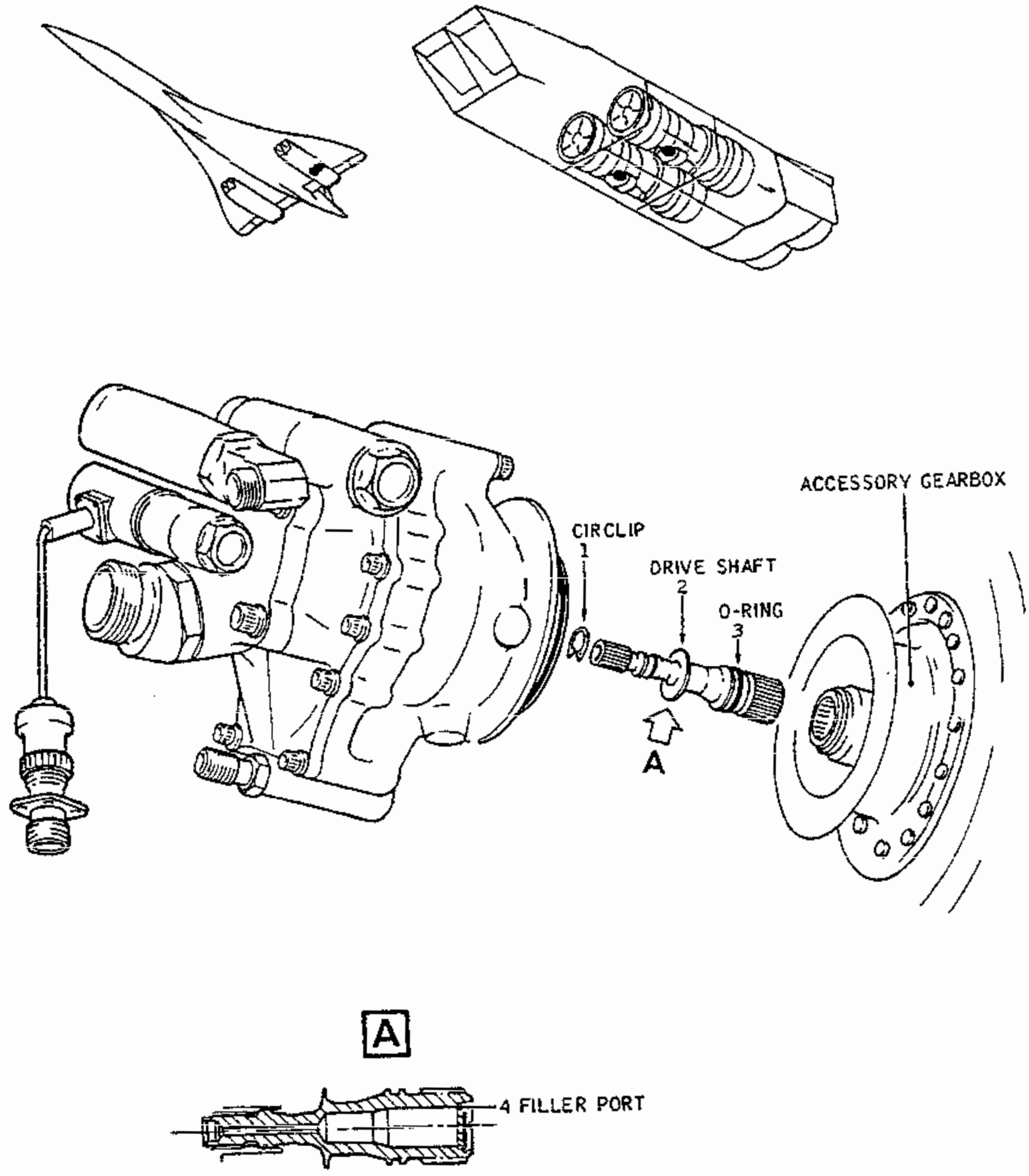
(2) Hold drive shaft horizontally so that filler port (4) is on uppermost side of shaft.

(3) Fill shaft to overflowing with Product No.021. Also lubricate outside of shaft with Product No.021.

E. Install

(1) Install shaft in housing on accessory gearbox, maintaining filler valve uppermost.

Printed in England



CMA 29 12 71 4 ADM0

R

Pump Drive Shaft
Figure 402

(2) Install circlip (1).

(3) Install engine-driven pump (Ref. paragraph 2).

F. Test

Proceed with test detailed in engine-driven pump removal/installation procedure.

G. Close-Up

The close-up steps are those for the engine driven pump removal/installation procedure.

4. Off-Load Solenoid Replacement

A. Prepare

(1) Proceed with preparation detailed in engine-driven pump removal/installation procedure.

B. Remove

(1) Remove connector.

(2) Remove four bolts to receptacle.

(3) Remove two Allen headed bolts and discard.

(4) Remove solenoid.

C. Preparation of Replacement Component

(1) Install seals.

(2) Lubricate with clean hydraulic fluid (Ref. 20-30-00, product No.11).

D. Install

(1) Secure solenoid sub-assembly to port cap with two new Allen headed bolts.

(2) Tighten bolts to between 50 to 60 lbf in (5.7 and 6.8 Nm) torque.

(3) Secure four bolts to receptacle.

(4) Secure connector.

(5) Wire lock bolts.

E. Test

(1) Proceed with test detailed in engine-driven pump removal/installation procedure.

F. Close-Up

(1) The close-up steps are those for the engine-driven pump removal/installation procedure.

PRINTED IN ENGLAND

LOW PRESSURE SWITCH - REMOVAL/INSTALLATION

1. General

A pressure switch is mounted on the delivery line of each engine-driven hydraulic pump to indicate any low pressure condition which may occur in the pump. The pressure switches are located in the wing between spars 64 and 65 :
- Between ribs 15 and 16 for engine 4 pump pressure switch (0225)
- Between ribs 18 and 19 for engine 3 pump pressure switch (0224).

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform, 14 ft. 7 in. (4.440m)	
Wing Protective Mat	
Electrical Ground Power Unit	

B. Prepare

(1) Open access door 153BB under fuselage and depressurize Blue system tank (Ref. 29-13-00, Servicing).

(2) Open access door 151DB under fuselage and depressurize Blue system (Ref. 29-12-00, Servicing).

(3) Trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
ENG 3 BLUE PUMP CONT IND	15-215	M 342	E 7
ENG 4 BLUE PUMP CONT IND		M 343	E 8

(4) Connect electrical ground power unit (Ref. 24-41-00, Servicing).

(5) Position wing protective mat.

(6) Open access doors to pressure switches :
- Access door 631AT for engine 3 pump pressure switch

- Access door 632AT for engine 4 pump pressure switch

WARNING : DISPLAY WARNING NOTICES ON ENGINE 3 PROHIBITING PRESSURIZATION OF BLUE HYDRAULIC SYSTEM BY HYDRAULIC GROUND POWER UNIT.
DISPLAY A WARNING NOTICE AT FLIGHT ENGINEER'S STATION PROHIBITING USE OF GROUND PRESSURIZING SYSTEM ELECTRIC PUMPS.

C. Remove

(1) Disconnect electrical connector (1).

(2) Remove attaching screw and remove clamp (3).

(3) Engine 3 pump low pressure switch (0224) :
- Remove pressure switch from elbow (5).
Engine 4 pump low pressure switch (0225) :
- Unscrew coupling nut (2) and remove pressure switch

(4) Cap open line end and plug ports.

D. Install

(1) Remove blanking caps and plugs.

(2) Engine 3 pump low pressure switch (0224) :
- Check that O-ring (4) is installed and in correct condition.
- Install pressure switch on elbow (5) and tighten, taking care not to damage O-ring (4).
Engine 4 pump low pressure switch (0225) :
- Position pressure switch, install and tighten coupling nut (2).

(3) Pressurize hydraulic tanks (Ref. 29-13-00, Servicing).

(4) Slightly loosen coupling nut (2) on pressure switch to bleed line of any air.
Tighten coupling nut (2).

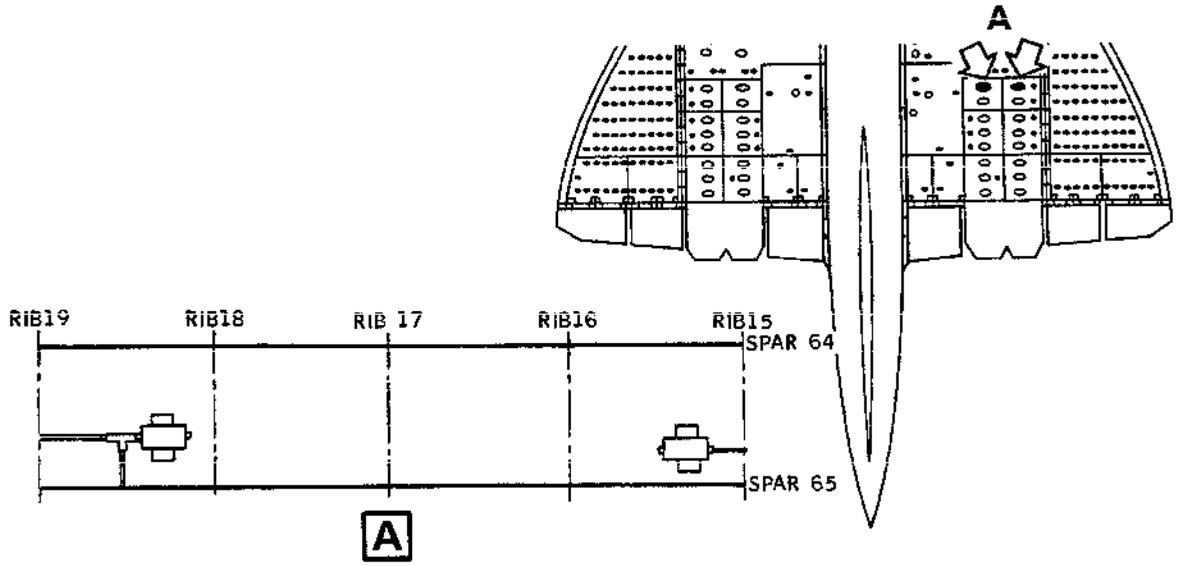
(5) Clean coupling nut and adjacent area, making certain that no trace of hydraulic fluid remains.

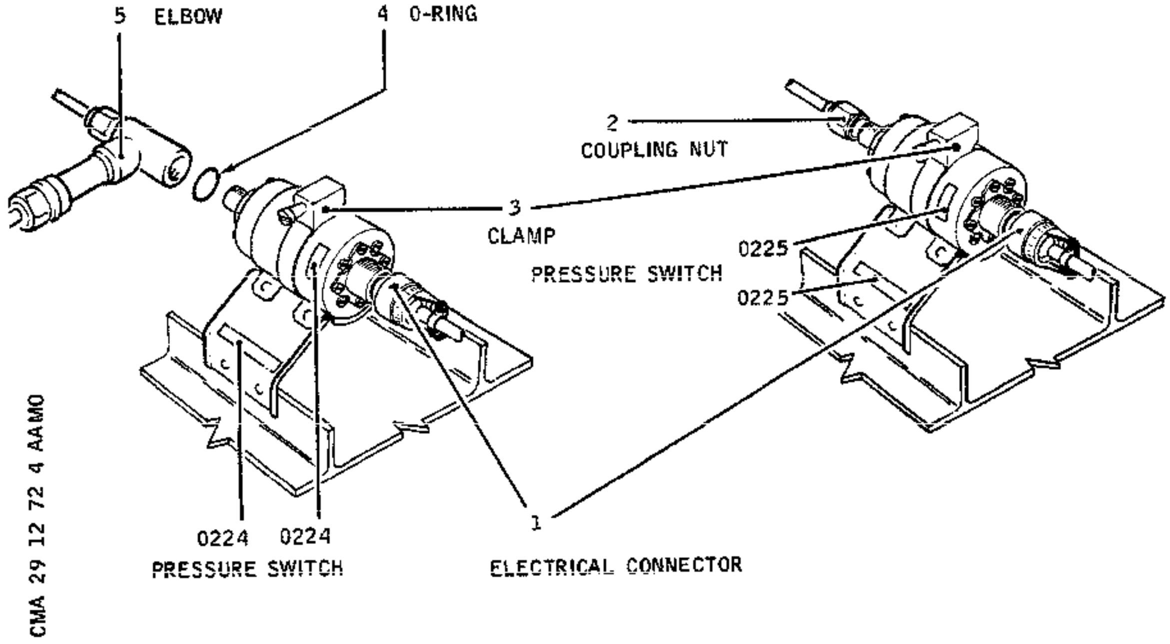
(6) Install clamp (3) and tighten attaching screw :

(7) Connect electrical connector (1).

E. Tests

(1) Energize aircraft electrical network (Ref. 24-41-00,





Low Pressure Switch Installation
Figure 401

Servicing).

(2) Remove safety clips and tags and reset the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
ENG 3 BLUE PUMP CONT IND	15-215	M 342	E 7
ENG 4 BLUE PUMP CONT IND		M 343	E 8

(3) On Flight Engineer's HYDRAULIC MANAGEMENT panel, engine-driven pump L/PRESS warning lights must come on. nate.

(4) Test pressure switch operation.

(a) Engine 3 pump low pressure switch (0224).

(a1) Pressurize Blue hydraulic system (Ref. 29-12-00, Servicing, Blue System Pressurization Using Hydraulic Ground Power Unit).
- On Flight Engineers HYDRAULIC MANAGEMENT panel, L/PRESS-3 warning light must go off when pressure increases to 140+50/-10 bars (2030 +720/-145 psi)

(a2) Shut down hydraulic ground power unit
- L/PRESS-3 warning light must come on when pressure decreases to 140+10/-25 bars (2030 +145/-290 psi)

(a3) Disconnect and remove hydraulic ground power unit (Ref. 29-12-00, Servicing).

(b) Engine 4 pump low pressure switch (0225). Check this pressure switch during run-up or cranking, of Engine 4 (Ref. 71-00-00, Adjustment/Test) During run-up or cranking of this engine :

(b1) Flight Engineer's HYDRAULIC MANAGEMENT panel, L/PRESS-4-BLUE warning light must go off when pressure increases to 140 +50/-10 bars (2030 +720/-145 psi).

(b2) At end of engine run-up or cranking, L/PRESS-4-BLUE warning light must come on when pressure decreases to 140 +10/-25 bars

(2030 +145/-290 psi).

(5) De-energize the aircraft electrical network and disconnect electrical ground power unit.

(6) Check pressure switches for leakage after tests (Ref. 24-41-00, Servicing).

F. Close-up

(1) Disconnect and remove electrical ground power unit (Ref. 24-42-00, Servicing).

(2) Close access doors 153BB, 151DB, 631AT and 632AT.

(3) Remove wing protective mat.

(4) Remove warning notices.

(5) Remove access platform.

ENGINE-DRIVEN PUMP DELIVERY FILTERS - REMOVAL/INSTALLATION

WARNING : OBSERVE THE ELECTRICAL SAFETY PRECAUTIONS DETAILED IN 24-00-00, SERVICING.

AN AIR INTAKE MUST NOT BE WORKED ON UNTIL THE SPILL DOORS AND RAMPS OF ALL INTAKES HAVE BEEN ELECTRICALLY AND HYDRAULICALLY ISOLATED, AS FOLLOWS :

(1) LOCKING PINS MUST BE INSTALLED IN THE SPILL DOOR HYDRAULIC SELECTOR VALVES (TWO VALVES FOR EACH INTAKE).

(2) ALL APPROPRIATE CIRCUIT BREAKERS MUST BE TRIPPED AND SAFETIED.

(3) THE ANTI-INTERFERENCE PLATE MUST BE INSTALLED OVER THE "AIR INTAKES" MANAGEMENT PANEL.

1. General

The removal/installation procedure described in this topic applies to both Blue system engine-driven pump delivery filters (3226 and 3227).

2. Engine-Driven Pump Delivery Filter

A. Equipment and Materials

DESCRIPTION	PART NO.
Locking Pins - Spill Door Selectors - Bay Nos. 2 and 4	E925037000
Locking Pins - Spill Door Selectors - Bay Nos. 1 and 3	E925038000
Special Materials (Ref. 20-30-00, No.109)	
Anti-Interference Plate - Air Intake Management Panel	E925068000
Access Platform, 5 ft. 11 in. (1.80 m)	
Container for Recovery of Hydraulic Fluid	
Blanking Plugs/Caps (for Hydraulic	

DESCRIPTION	PART NO.
Lines, Filter and Selector Valve)	
Warning Notices	
Circuit Breaker Safety Clips	

B. Prepare

(1) Open access door 153BB and depressurize Blue system tank (Ref. 29-13-00, Servicing).

(2) Open access door 151DB and depressurize Green, Blue and Yellow hydraulic systems (Ref. 29-11-00, 29-12-00, 29-21-00, Servicing).

WARNING : DISPLAY WARNING NOTICES ON ENGINES 1, 2 AND 3 PROHIBITING PRESSURIZATION OF BLUE, GREEN AND YELLOW HYDRAULIC SYSTEMS BY HYDRAULIC GROUND POWER UNIT.

DISPLAY A WARNING NOTICE AT FLIGHT ENGINEER'S STATION PROHIBITING USE OF GROUND PRESSURIZING SYSTEM ELECTRIC PUMPS.

DISPLAY A WARNING NOTICE ON THE ENGINE START PANEL AT THE FLIGHT ENGINEER'S STATION PROHIBITING ENGINE STARTING.

POSITION SAFETY BARRIERS TO PREVENT ACCESS TO AIR INTAKE SPILL DOOR TRAVEL RANGE.

(3) Install anti-interference plate E925068000 over Flight Engineer's AIR INTAKES management panel.

(4) Install locking pins E925037000 and E925038000 (Ref. 71-62-00, Servicing).

(5) Trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
Engine 3			
INT 3 MAIN HYD SUP	5-213	3K1950	A 7

Printed in England

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
INT 3 ST'BY HYD SUP	15-215	3K1960	C18
AICU 3A SUP	2-213	3K2050	H13
AICU 3B SUP	13-216	3K2051	B 3
Engine 4			
INT 4 MAIN HYD SUP	15-216	4K1950	A 8
INT 4 ST'BY HYD SUP	5-213	4K1960	A 6
AICU 4A SUP	14-216	4K2050	B 5
AICU 4B SUP	2-213	4K2051	B14
Engines 1, 2, 3 and 4			
HYD GRND CHECK OUT SEL VALVE CONT	15-216	M 626	F22
HYD TANK COMPR CONT	15-215	M 602	D 8

(6) Open access door 431JL for filter 3226, and 441JR for filter 3227.

C. Remove

R R (1) Disconnect line (15) from filter and from selector valve. Remove ligatures (14) and remove line (15). Plug/cap open ports and line ends.

R R (2) Remove cotter pins (13), remove nuts (12).

(3) Remove filter (1) (pull downwards to disengage). Plug open ports.

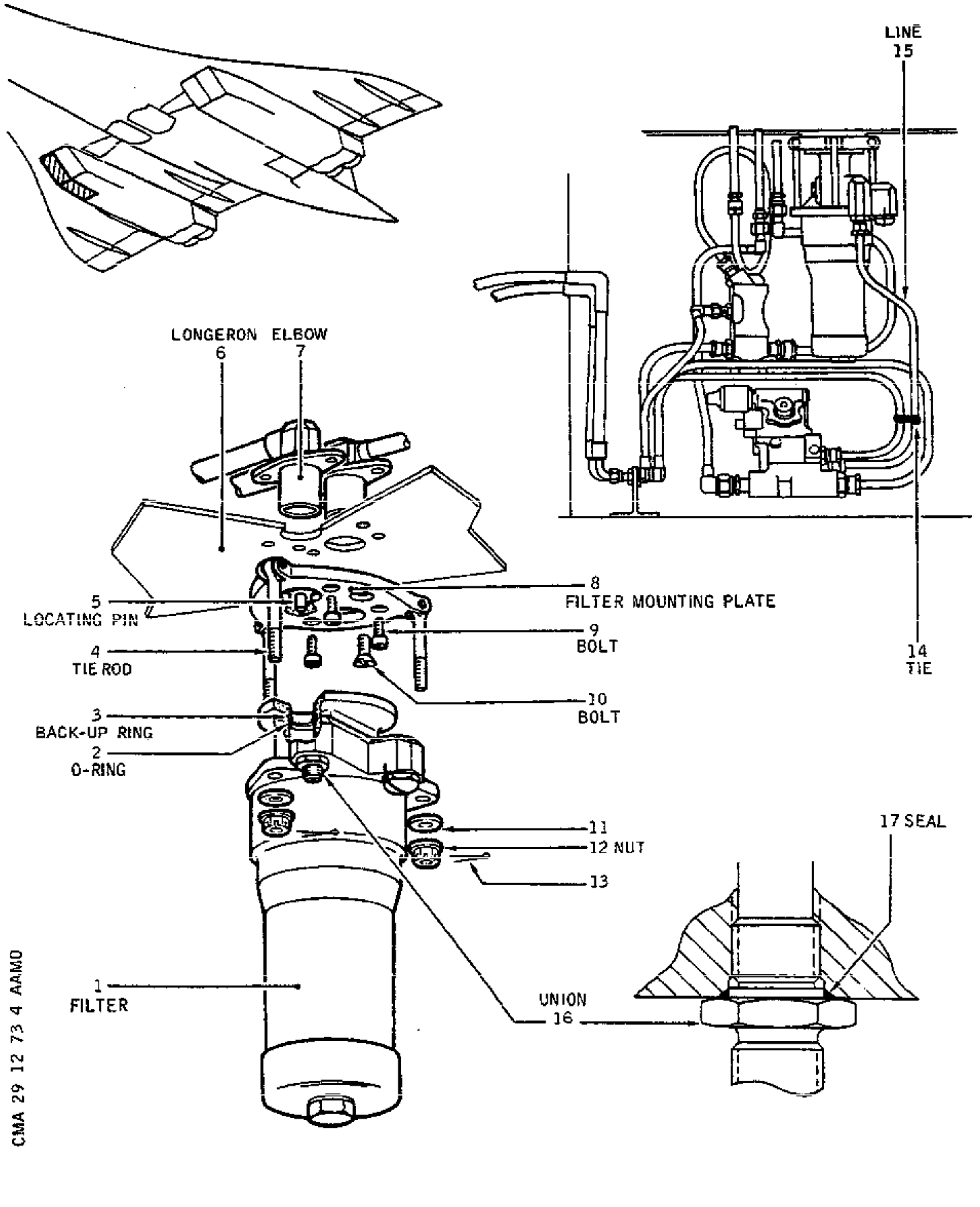
(4) Remove bolts (9).

(5) Remove bolt (10).

(6) Remove filter mounting plate (8).

D. Preparation of Replacement Component

R R R (1) Remove and discard O-rings (2), replace with new O-rings. Back-up rings (3) must be installed on top of O-rings (2), as shown in illustration.



R Engine-Driven Pump Delivery Filter
Figure 401

(2) Remove union (16) from removed filter, replace seal (17), install union (16) on replacement filter.

E. Install

(1) Install filter mounting plate (8) on longeron (6). Check that locating pin (5) is engaged in associated recess on longeron (6). Attach assembly with bolt (10).

(2) Install bolts (9) to attach elbows (7) to filter mounting plate (8). Torque to between 75 and 80 lbf.in. (0.847 and 0.903 m.daN).

<u>NOTE</u> : Bolts (9) shall be coated with product No.109 prior to installation.

**ON A/C 001-001,

(3) Remove blanking plugs, position and install filter (1) on filter mounting plate (8). Install nuts (12) on tie rods (4) and torque to between 120 and 130 lbf.in. (1.355 and 1.468 m.daN). Safety with a cotter pin (13).

R **ON A/C 002-007,

(3) Remove blanking plugs, position and install filter (1) on filter mounting plate (8). Install washer (11). Install nuts (12) on tie rods (4) and torque to between 120 and 140 lbf.in. (1.355 and 1.581 m.daN). Safety with a cotter pin (13).

(4) Remove blanking plugs/caps and connect line (15) to filter and to selector valve. Tighten nuts.

(5) Install ligatures (14) (Ref. 20-23-14).

(6) Clean filter and adjacent area. Make certain that no trace of hydraulic fluid remains.

(7) Remove warning notices.

F. Test

Filter (3227) on engine 4 can only be checked for leakage after engine has been ground run at full power, or motored (Ref. 71-00-00, Adjustment/Test).

To check filter (3226) on engine 3, pressurize Blue hydraulic system, using a hydraulic ground power unit (Ref. 29-12-00, Servicing).

G. Close-Up

(1) Replenish hydraulic tank as required (Ref. 12-12-29).

(2) Remove locking pins E925037000 and E925038000 (Ref. 71-62-00, Servicing).

(3) Remove anti-interference plate E925068000.

(4) Remove safety clips and reset circuit breakers.

(5) Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(6) Clean access doors 151DB, 153BB, 431JL or 441JR.

(7) Remove access platform.

END OF THIS SECTION

NEXT

R HYDRAULIC TANK PRESSURIZING SYSTEM - DESCRIPTION AND OPERATION

1. General
(Ref. Fig. 001)

R Each hydraulic tank is pressurized by air, to 4.5 bars (65 psi)
R relative pressure, in order to ensure a satisfactory supply of
R fluid to the pumps. Pressurizing air is bled from the four
R engines.

2. Description

R The reservoir pressurizing system includes the following components :

- Four non-return valves (5062) (5063) (5064) and (5065)
- R Two ground connectors (5004) and (0181)
- Four thermal shut-off valves (3186) (3185) (3184) and (3182)
- Two air pressure reducing valves (3179) and (3180)
- Two restrictors (175) and (174)
- Two non-return valves (0173) and (0172)
- One ground connector (0191)
- A restrictor (192) (on ground pressurization line)
- R An air compressor (1349)
- A pressure switch (1348)
- A non-return valve (1347)

R 3. Valves - Thermal Shut-Off
(Ref. Fig. 002)

A. Purpose

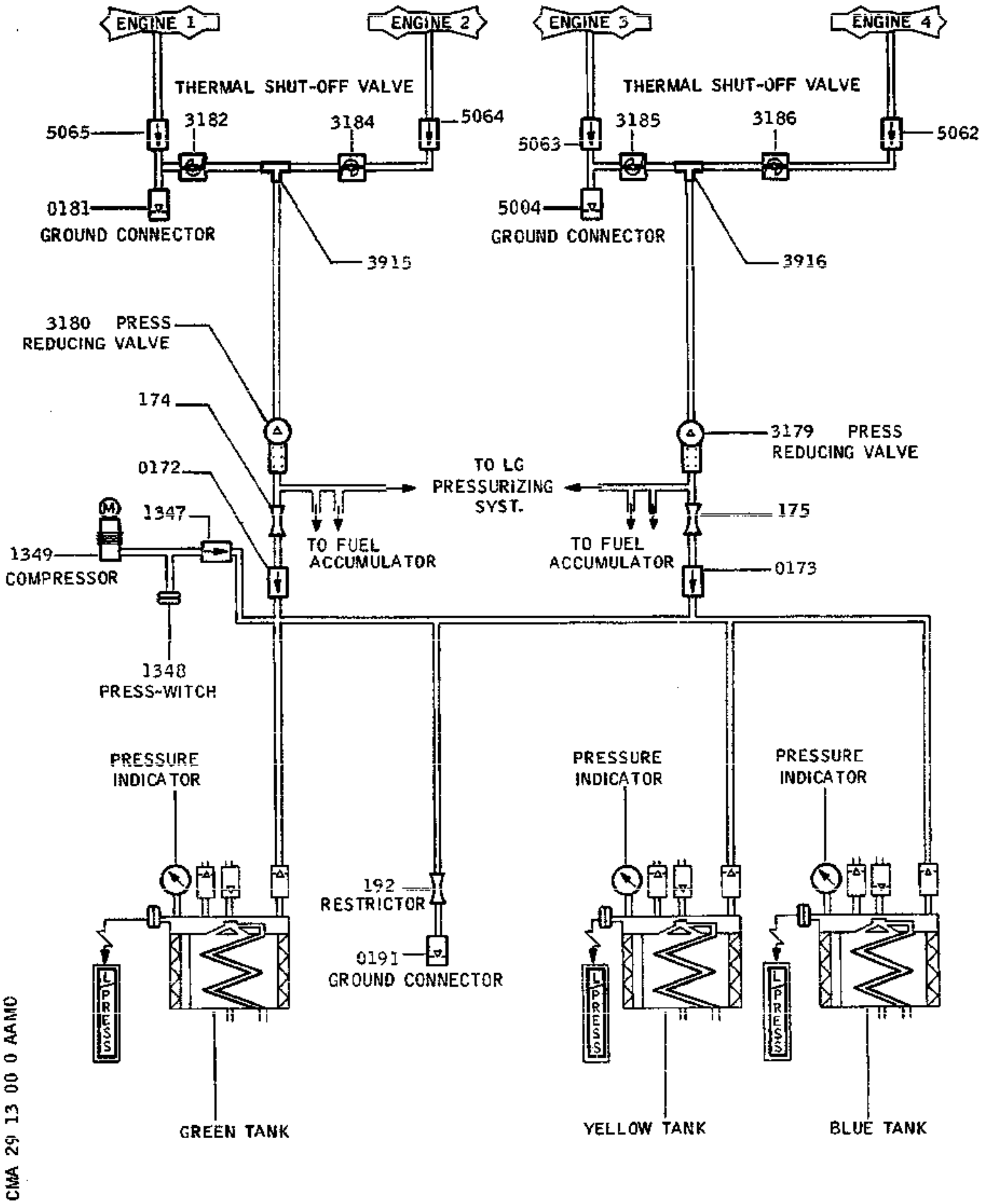
R These valves ensure that, in the event of a rupture in the
R downstream ducting, air temperature in the wing does not,
R under any circumstances, exceed 220°C (428°F). The valves
R are normally open.

B. Operation

If a rupture occurs in the downstream ducting, there is a
R consequent increase in airflow and therefore in temperature. The resulting expansion causes amplifier lever (3) to open control poppet (4), which then interconnects upstream pressure and servo-chamber (1) via servo-pipe (2). Servo-
R chamber pressure moves piston (10) which opens orifice (8). Upstream pressure then enters servo-chamber (1) directly and moves the piston to the locked position. Disc valve (7) shuts off the air passage, and the valve is closed.

The valve can be reopened only on the ground by manually

Printed in England



R

Hydraulic Tank Pressurization
Figure 001

pulling latch (9). This enables spring (11) to return the
R moveable assembly to the open position.

C. Ground Testing

The valve can be connected up to a ground service unit by
R connector fitting (6) on the chamber at the upstream end
of the valve. A manually operated test mechanism (5), with
the same function as the amplifier lever, opens control
poppet (4). Operation from this stage on is as described
in the previous paragraph.

NOTE : The test mechanism can be used only when valve temperature is below 100°C (212°F).

R 4. Valve - Pressure Reducing
(Ref. Fig. 003)

R If the pressure of air in the tank falls below that at the
R pressure reducing valve outlet, spring (5) opens valve (2), or
maintains it in open position, by means of needle (3). As pres-
sure increases downstream, it is transmitted to chamber (6) via
tube (8) attached to spacer (7), and acts on diaphragm (4), thus
causing compression of spring (5). Spring (1) gradually drives
the needle valve to the closed position. The valve is fully
R closed when downstream pressure reaches its regulation value. If
R downstream pressure drops below its regulation value, the pres-
R sure in chamber (6) and the force of spring (1) are no longer
R sufficient to balance the force of spring (5), which pushes back
needle valve (2). The valve opens, thus allowing normal airflow.

5. Restrictor

In the event of failure of the pressure reducing valve, the
R restrictor ensures that the flow rate of air into the tank is
R below the discharge capacity of the air pressure relief valve.

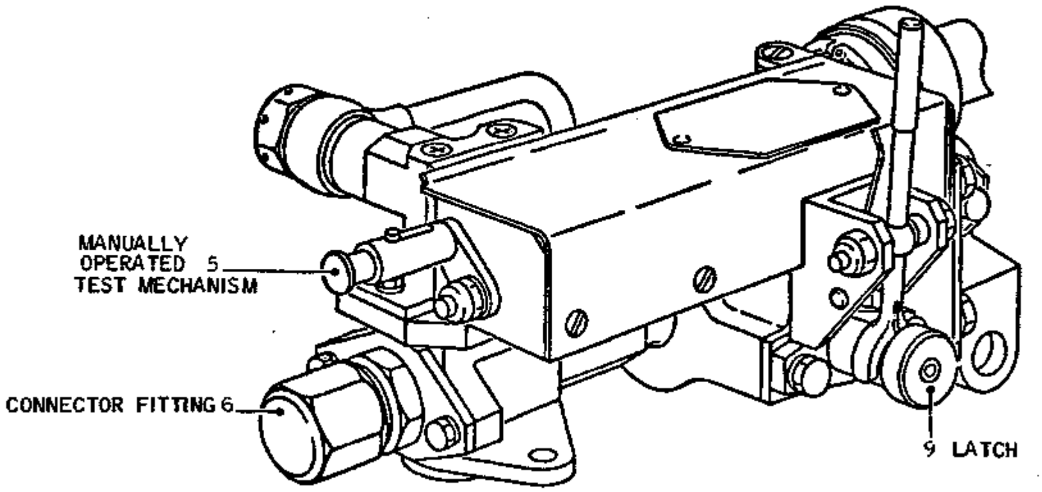
R 6. Compressor - Air

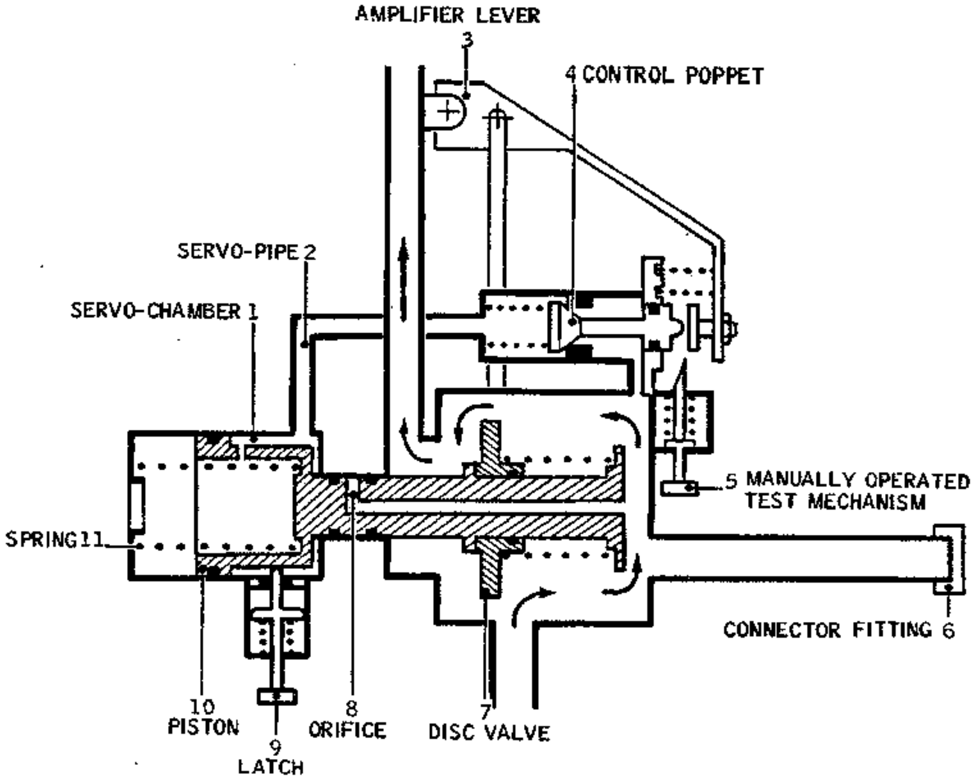
NOTE : The compressor shall be used on the ground only.

The compressor is driven by a 3-phase electric motor. It pro-
R vides sufficient air pressure in the hydraulic tank to ensure
correct operation of the pumps.

The compressor is started up by pressing the AIR COMPRESSOR push-button on the Flight Engineer's HYDRAULIC MANAGEMENT panel.

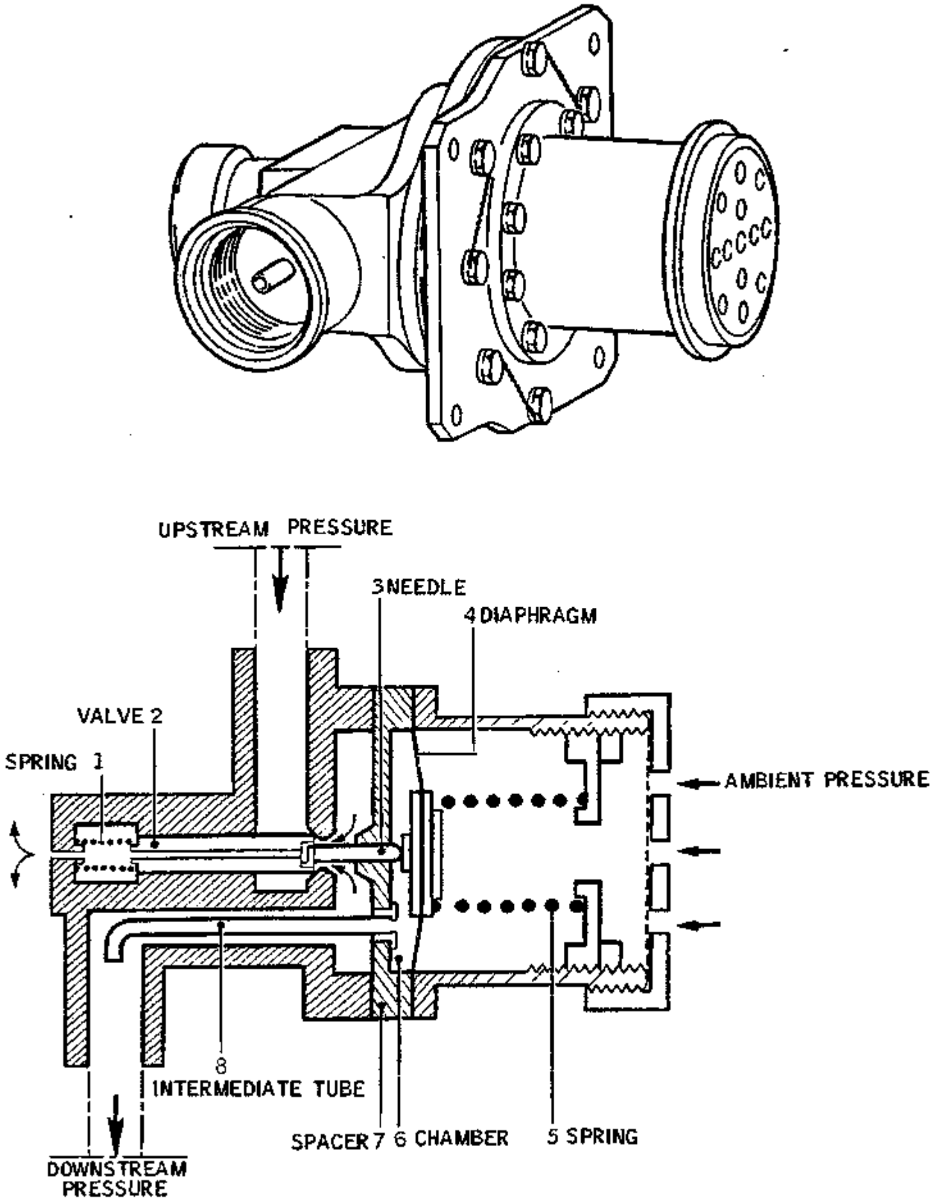
It is shut down automatically by a pressure switch as soon as pressure is sufficient.





CMA 29 13 00 0 ACM0

Thermal Shut-Off Valve
Figure 002



CMA 29 13 00 0 AEMO

Pressure Reducing Valve
Figure 003

In the event of pressure switch failure, a safety timer device automatically shuts down the compressor after it has operated for 2 min. 45 sec.

An overheat sensor cuts off power supply to the electric motor if temperature in the compressor reaches a critical point.

7. Operation
(Ref. Fig. 001)

The hydraulic tanks are supplied with air by two systems, each of which receives air from a group of two engines :

- Engines 1 and 2 supply one system
  and
- Engines 3 and 4 supply the other system.

Pressurizing air from both engines 1 and 2 crosses a thermal shut-off valve and a non-return valve before entering a manifold. From the manifold, the air is channelled to a pressure reducing valve, set to 4.5 bars (65 psi), then through a restrictor, a non-return valve, and finally into the Green, Blue and Yellow system tanks via another non-return valve.

Air supplied from engines 3 and 4 is routed in the same way as that from engines 1 and 2, and also supplies the three tanks.

Should one engine in a group shut down, the non-return valves prevent the air supplied by the operating engine from escaping via the engine which is stopped.

The non-return valves mounted downstream of the restrictors have the same role for each group of engines, 1 and 2, or 3 and 4.

Two safety valves are mounted on each tank :

- A pressure relief valve, limiting any overpressure in the tank to 4.8 bars relative pressure (69 psi)
- A vacuum relief valve, which opens when the pressure diffe-
R rential between the tank and ambient is equal to or less than
R 0.040 bars (0.58 psi).

An on-board air compressor or an external air source is used to pressurize the tanks when the aircraft is on the ground with the engines shut down.

The compressor is driven by an electric motor, and is controlled from the Flight Engineer's station.

Ground connectors enable connection of the external air source to the tank pressurization system. A restrictor on the line from

R the ground connector protects the pressurization system in the
R event of excessive output from the air source.

8. Indicating

Pressurization monitoring components are located at the bottom
R of each tank.
They are :

R - A direct-reading air pressure indicator, graduated in bars
R - A low pressure switch set to 2 ± 0.1 bars (29 ± 1.4 psi)
R When the pressure switch closes, the associated L/PRESS caption light on the Flight Engineer's panel comes on.

HYDRAULIC TANK PRESSURIZING SYSTEM - TROUBLE SHOOTING

1. General

The following trouble shooting procedures are intended to enable faults found in the hydraulic tank pressurizing system to be quickly rectified.

For practical purposes, trouble shooting procedures has been broken down in three parts dealing with :

- Pressurizing circuit
- Air compressor
- Thermal shut-off valves

The defects can be isolated with the aid of trouble shooting procedures (Ref. Para. 3) and traced through OK and NOT OK paths to the appropriate charts or other specified rectification action as may be required. If a defect occurs, perform the appropriate rectification action, then repeat the operation at which the defect was encountered to ensure that the operation is OK.

Bracketed numbers in the procedures and charts indicate items on the component identification table (Ref. Table 101). The table provides information including component location required for rectification.

All procedures dealing with trouble shooting are based on the assumption that electrical wiring is serviceable, all associated circuit breakers are set and electrical power is available, unless otherwise stated. If the fault is not rectified, check the wiring in accordance with the Wiring Diagram Manual (Ref. Table 101).

2. Prepare

A. Equipment and Materials

DESCRIPTION	PART NO.
Compressed Air Supply Unit with Pressure Reducing Valve and Pressure Gauge	
Electrical Ground Power Unit	
Chronometer	

B. Refer to chapter 71-00-00, Servicing for opening of engine cowls.

C. Open access door 153BB under fuselage.

D. Check that fluid level in hydraulic tanks is correct.

E. Depressurize hydraulic tanks (Ref. 29-13-00, Servicing).

F. When pressure is nul in each hydraulic tank, close depressurization valves and secure with safety pins.

G. Make certain that the following circuit breakers are set :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
HYD TANK AIR COMP	13-215	M 601	G 7
HYD TANK COMPR CONT	15-215	M 602	D 8

3. Trouble Shooting : Pressurizing Circuit

```
******************************************************
* Proceed with preparation described in Paragraph 2.*
* Connect compressed air supply unit to ground con- *
* nector on Engine 1. Pressurize and vary pressure  *
* to between 72.5 and 136.3 psi (5 and 9.4 bar).    *
* Pressure read on pressure indicator of each tank  *
* equals 62 +2 or -4 psi (4.5 +0.15 or -0.25 bar).  *
******************************************************
   ||
   ||    |    --------------------------------------------------
   OK    NOT OK ---| Pressure above 67 psi (4.65 bar) in the 3 tanks|
   ||    |         | Replace pressure reducing valve [1].           |
   ||    |    --------------------------------------------------
   ||    |
   ||    |    --------------------------------------------------
   OK    NOT OK ---| Pressure below 61 psi (4.25 bar) in the 3 tanks|
   ||    |         | Ref Chart 101.                                 |
   ||    |    --------------------------------------------------
   ||    |
******************************************************
* Stop pressurizing and connect compressed air      *
* supply unit to ground connector 5004 on engine 3. *
* Release pressure in the 3 tanks and close the de- *
* pressurizing valve.                               *
* Pressurize and vary pressure to between 72.5 and  *
* 136.3 psi (5 and 9.4 bar).                        *
* Pressure read on pressure indicator of each tank  *
* equals 65 +2 or -4 psi (4.5 +0.15 or -0.25 bar)   *
******************************************************
   ||    |
   ||    |    --------------------------------------------------
   OK    NOT OK----| Pressure above 67 psi (4.65 bar) in the 3 tanks|
   ||    |         | Replace pressure reducing valve [2].           |
   ||    |    --------------------------------------------------
   ||    |
   ||    |    --------------------------------------------------
   OK    NOT OK----| Pressure below 61 psi (4.25 bar) in the 3 tanks|
   ||              | Ref Chart 102.                                 |
   ||         --------------------------------------------------
   ||
******************************************************
* Hydraulic tank pressurizing circuit is operational*
* Restore aircraft to initial configuration.        *
******************************************************
```

4. Trouble Shooting : Air Compressor

```
****************************************************
* Proceed with preparation described in Paragraph 2.*
* Connect electrical ground power unit and energize *
* the aircraft electrical network (Ref. 24-41-00,   *
* Servicing).                                       *
* Open access door 153BB, depressurize Green, Blue  *
* and Yellow tanks.                                 *
* On Flight Engineer's HYDRAULIC MANAGEMENT panel,  *
* press AIR COMPRESSOR push-button and start chrono-*
* meter. The compressor operates                    *
****************************************************
    ||    |
    ||    |        ---------------------------------------------------
    OK    NOT OK----| The air compressor is failed. Ref Chart 103.    |
    ||    |        ---------------------------------------------------
    ||    |
****************************************************
* When pressure indicator on each tank reads 48.6 + *
* or - 3 psi (3.35 + or - 0.2 bar), the compressor  *
* stops operating.                                  *
****************************************************
    ||    |
    ||    |        ---------------------------------------------------
    OK    NOT OK----| Replace pressure switch [9].                    |
    ||    |        ---------------------------------------------------
    ||    |
****************************************************
* Depressurize the 3 tanks but do not close depress-*
* urization valves.                                 *
* Press AIR COMPRESSOR push-button and start chrono-*
* meter.                                            *
* The compressor will stop after 2'45". If not,     *
* trip circuit breaker M601 on panel 13-215, Map Ref*
* G7.                                               *
****************************************************
    ||    |
    ||    |        ---------------------------------------------------
    OK    NOT OK----| Replace time-delay relay [5].                   |
    ||             ---------------------------------------------------
    ||    |
****************************************************
* The air compressor is operational.               *
* Restore aircraft to initial configuration.       *
****************************************************
```

5. Trouble Shooting : Thermal Shut-Off Valves

```
*****************************************************
* Proceed with preparation described in Paragraph 2.*
* On wing upper surface, open access doors 534ET,   *
* 533FT, 633FT and 634ET to gain access to thermal  *
* shut-off valves.                                  *
* On engine 1 thermal shut-off valve :              *
* Remove test connector cap and connect compressed  *
* air supply unit with pressure reducing valve and  *
* pressure gauge.                                   *
* Open compressed air supply unit and select 18.8   *
* psi (1.3 bar) pressure approximately.             *
* Press test plunger.                               *
* The latch engages (pushed in by 4 mm approx.)     *
*****************************************************
    ||   |
    ||   |     ---------------------------------------------------
    OK   NOT OK----| The latch does not engage. Ref Chart 104.     |
    ||             ---------------------------------------------------
    ||
*****************************************************
* The thermal shut-off valve operates correctly.    *
* Shut off and disconnect compressed air supply unit*
* from test connector.                              *
* Return latch to initial position.                 *
* Cap test connector and close access door.         *
* Repeat test for each thermal shut-off valve.      *
* The latch engages (pushed in by 44 mm approx.)    *
*****************************************************
    ||   |
    ||   |     ---------------------------------------------------
    ||   |    | The latch does not engage.                         |
    OK   NOT OK----| - Eng 2 thermal shut-off valve: Ref Chart 104  |
    ||   |    | - Eng 3 thermal shut-off valve: Ref Chart 105      |
    ||   |    | - Eng 4 thermal shut-off valve: Ref Chart 105      |
    ||   |     ---------------------------------------------------
    ||   |
*****************************************************
* Thermal shut-off valves operate correctly.        *
* Restore aircraft to initial configuration.        *
*****************************************************
```

PRESSURE BELOW 61 PSI (4.25 BAR) IN THE 3 TANKS.

GROUND EQUIPMENT REQUIRED	
DESCRIPTION	PART NO.
COMPRESSED AIR SUPPLY UNIT WITH PRESSURE REDUCING VALVE AND PRESSURE GAUGE.	

Pressurize tanks to 58 psi (4 bar) through ground connector 0181 [19] on engine 1.
Check presssure reducing valve [1] for leakage.

- NOT OK ---- Replace pressure reducing valve [1].
- OK ↓

Stop pressurizing through ground connector 0181.
Pressurize tanks to 65 psi (4.5 bar) through ground connector 0191 [21] in zone 153.
Pressure is normal in each tank.

- NOT OK ---- Check tanks for leakage.
  - OK: Check pipes in hydraulics bay for leakage.
  - NOT OK: Replace faulty component.
- OK ↓

Stop pressurizing. Depressurize tanks and close depressurization valves.
Disconnect supply lines from air supply control units of fuel accumulators (Ref 28-21-12, Removal/Installation). Blank off open lines.
Pressurize tanks to 65 psi (4.5 bar) through ground connector 0181 [19] on engine 1.
Pressure is normal in each tank.

Chart 101 (Sheet 1 of 2)

OK	NOT OK
Perform a leakage test in fuel accumulator pressurizing circuit (Ref 28-XX-XX).	Check lines for leakage.

Chart 101 (Sheet 2 of 2)

```
**************************************-------------------------------
* PRESSURE BELOW 61 PSI (4.25 BAR) IN*|GROUND EQUIPMENT REQUIRED    |
* THE 3 TANKS.                       *|-----------------------------|
**************************************|DESCRIPTION      PART NO.    |
                                      |-----------------------------|
                                      | COMPRESSED AIR              |
                                      | SUPPLY UNIT WITH            |
                                      | PRESSURE REDUCING           |
                                      | VALVE AND PRESSURE          |
                                      | GAUGE.                      |
                                      -------------------------------

*****************************************************
* Pressurize tanks to 58 psi (4 bar) through ground *
* connector 5004 [20] on engine 3.                  *
* Check pressure reducing valve [2] for leakage.    *
*****************************************************
   ||    |
   ||    |    --------------------------------------------------
   OK    NOT OK----| Replace pressure reducing valve [2].         |
   ||         --------------------------------------------------
   ||
*****************************************************
* Stop pressurizing through ground connector (5004).*
* Pressurize tanks to 65 psi (4.5 bar) through      *
* ground connector 0191 [21] in zone 153.           *
* Pressure is normal in each tank.                  *
*****************************************************
   ||    |
   ||    |    --------------------------------------------------
   OK    NOT OK----| Check tanks for leakage.                     |
   ||    |    --------------------------------------------------
   ||    |                  |                          |
   ||    |                  OK                      NOT OK
   ||    |    --------------------------------------------------
   ||    |    | Check pipes in hydraulics|| Replace faulty       |
   ||    |    | bay for leakage.         || component.           |
              --------------------------------------------------
```

Chart 102 (Sheet 1 of 2)

```
   ||
*****************************************************
* Stop pressurizing. Depressurize tanks and close   *
* depressurization valves.                          *
* Disconnect supply lines from air supply control   *
* units of fuel accumulators (Ref 28-21-12, Removal/*
* Installation). Blank off open lines.              *
* Pressurize tanks to 65 psi (4.5 bar) through      *
* ground connector (5004).                          *
* Pressure is normal in each tank.                  *
*****************************************************
        |                               |
        OK                           NOT OK
        |                               |
---------------------------------  ---------------------------------
| Perform leakage test in fuel  |  | Check lines for leakage.      |
| accumulator pressurizing      |  |                               |
| circuit (Ref 28-XX-XX).       |  |                               |
---------------------------------  ---------------------------------
```

Chart 102 (Sheet 2 of 2)

```
*************************************-----------------------------
* THE AIR COMPRESSOR IS FAILED.     *|GROUND EQUIPMENT REQUIRED   |
*************************************|----------------------------|
                                     |DESCRIPTION      PART NO.   |
                                     |----------------------------|
                                     | MULTIMETER                 |
                                     ------------------------------
*****************************************************
* Trip circuit breaker M601 on panel 13-215, Map ref*
* G7 and circuit breaker M602 on panel 13-215, Map  *
* Ref D8.                                           *
* In zone 153, disconnect connector from compressor *
* M607.                                             *
* Reset circuit breakers M601 and M602.             *
* Press AIR COMPRESSOR push-button.                 *
* Check 3-phase voltage between terminals M, J, K of*
* plug M607A.                                       *
*****************************************************
         |                              |
        OV                            200 V-----------
         |                                           |
------------------------------          -------------------------
| Check continuity between   |          | Replace air compressor|
| terminals E and F of connec-|--------OK--| M607 [10].          |
| tor M607 on compressor.    |          |                       |
------------------------------          -------------------------
        |
    NOT OK
        |
*****************************************************
* Trip circuit breakers M601 and M602. In zone 153, *
* connect plug to air compressor. On connector UT   *
* 1837 (LH hyd. relay box, zone 2-213) connect ter- *
* minal 1B to ground.                               *
* Press AIR COMPRESSOR push-button : the compressor *
* operates.                                         *
*****************************************************
         |         |    ---------------------------------------
     NOT OK        OK----| Replace pressure switch M606 [9].   |
         |              ---------------------------------------
*****************************************************
* On connector UT1837 (LH hyd. relay box, zone      *
* 2-123),connect terminal 1C to ground.             *
* The air compressor operates correctly.            *
*****************************************************
         |         |
         |         |
```

Chart 103 (Sheet 1 of 2)

```
      |          |     ------------------------------------------
 NOT OK         OK     | Replace AIR COMPRESSOR push-button [8].  |
      |                ------------------------------------------
****************************************************
* On connector UT 1837 (LH hyd. relay box, in zone *
* 2-123) check voltage between terminals 1A and the *
* ground.                                          *
****************************************************
      |          |     ------------------------------------------
    28 V       0 V---| Replace circuit breaker M602 [4].        |
      |                ------------------------------------------
****************************************************
* On connector UT1837 (LH hyd. relay box, in zone  *
* 2-123) check voltage between terminal 2A and the *
* ground.                                          *
****************************************************
      |          |     ------------------------------------------
    28 V       0 V---| Replace relay M603 [5].                  |
      |                ------------------------------------------
****************************************************
* Trip circuit breaker M601 on panel 13-215, Map Ref*
* G7. Remove relay M608 [7] (rear racking, main    *
* structure LH, in zone 7-243).                    *
* Check continuity between terminals A3-A2, B3-B2  *
* and C3-C2 of relay M608.                         *
****************************************************
      |               |     -------------------------------------
     0 V          200 V---| Replace relay M608 [7].              |
      |               |     -------------------------------------
****************************************************
* Check circuit breaker M601 on panel 13-215, Map  *
* Ref G7.                                          *
****************************************************
      |               |
     OK           NOT OK--------------
      |                              |
------------------------------  ---------------------------------
| Replace relay M604 [6].    |  | Replace circuit breaker M601 [3] |
------------------------------  ---------------------------------
```

Chart 103 (Sheet 2 of 2)

THE LATCH DOES NOT ENGAGE.	

GROUND EQUIPMENT REQUIRED

DESCRIPTION	PART NO.
COMPRESSED AIR SUPPLY UNIT WITH PRESSURE REDUCING VALVE AND PRESSURE GAUGE.	

* Maintain 18.8 psi (1.3 bar) pressure at suspected valve [11] or [12].
* Check that pressure is correct in each tank 18.8 psi (1.3 bar).

NOT OK → (continue below)

OK → Replace thermal shut-off valve [11] or [12].

* Stop pressurizing.
* Open cowl 415HB to reach thermal shut-off valve on engine 1 (Ref 71-00-00, Servicing).
* Open cowl 426HB to reach thermal shut-off valve on engine 2 (Ref 71-00-00, Servicing).
* Isolate suspected thermal shut-off valve by blanking off its normal supply at level of hose located on fire shield between the engines.
* Apply 18.8 psi (1.3 bar) to thermal shut-off valve.
* Check pressure in hydraulic tanks. This must be 18.8 psi (1.3 bar).

OK	NOT OK
If thermal shut-off valve failed on engine 1 : -replace non-return valve [12] If thermal shut-off valve failed on engine 2 : -replace non-return valve [14]	If thermal shut-off valve failed on engine 1. -replace non-return valve [14] If thermal shut-off valve failed on engine 2 : -replace non-return valve [12]

Chart 104

THE LATCH DOES NOT ENGAGE.

GROUND EQUIPMENT REQUIRED	
DESCRIPTION	PART NO.
COMPRESSED AIR SUPPLY UNIT WITH PRESSURE REDUCING VALVE AND PRESSURE GAUGE.	

- Maintain 18.8 psi (1.3 bar) pressure at thermal shut-off valve [15] or [17].
- Check that pressure is correct in each tank (18.8 psi (1.3 bar)).

OK ---- Replace thermal shut-off valve [15] or [17].

NOT OK:

- Stop pressurizing.
- Open cowl 435AB to reach thermal shut-off valve on engine 4 (Ref 71-00-00, Servicing).
- Isolate suspected thermal shut-off valve by blanking off its normal supply at level of hose located on fire shield between the engines.
- Apply 18.8 psi (1.3 bar) to thermal shut-off valve.
- Check pressure in hydraulic tanks. This must be 18.8 psi (1.3 bar).

OK	NOT OK
If thermal shut-off valve failed on engine 3 : -replace non-return valve [16] If thermal shut-off valve failed on engine 4 : -replace non-return valve [18]	If thermal shut-off valve failed on engine 3 : -replace non-return valve [18] If thermal shut-off valve failed on engine 4 : -replace non-return valve [16]

Chart 105

Printed in England

ITEM No. AND DESCRIPTION	ACCESS PANEL	PANEL/ ZONE	EQUIP. IDENT.	POSITION	MANUAL REF. MAINT. TOPIC	MANUAL REF. WIRING DIAGRAM
[1] Pressure reducing valve	153AB	153	3180			
[2] Pressure reducing valve	153AB	154	3179			
[3] Circuit breaker		13-215	M601	G 7	24-50-00 R/I	29-13-01
[4] Circuit breaker		13-215	M602	D 8	24-50-00 R/I	29-13-01
[5] Time-delay relay	123AB	2-123	M603		29-00-00 R/I	29-13-01
[6]Air compressor control relay	123AB	2-123	M604		29-00-00 R/I	29-13-01
[7] Overheat safety relay		7-243	M608		29-00-00 R/I	29-13-01
[8] Compressor control push-button		3-214	M605		29-00-00 R/I	29-13-01
[9] Compressor monitoring pressure switch	153BB		M606			29-13-01
[10]Air compressor	153BB		M607		29-13-24 R/I	29-13-01
[11] Thermal shut-off valve, engine 1	534ET		3182		29-13-11 R/I	
[12] Non-return valves engine 1	415HB		5065			
[13] Thermal shut-off valve, engine 2	533FT		3184		29-13-11 R/I	

ITEM No. AND DESCRIPTION	ACCESS PANEL	PANEL/ ZONE	EQUIP. IDENT.	POSITION	MANUAL REF. MAINT. TOPIC	WIRING DIAGRAM
[14] Non-return valve, engine 2	426HB					
[15] Thermal shut-off valve, engine 3	633FT		3185		29-13-11 R/I	
[16] Non-return valve, engine 3	435HB		5063			
[17] Thermal shut-off valve, engine 4	634ET		3183		29-13-11 R/I	
[18] Non-return valve, engine 4	446HB		5062			
[19] Ground connector	415HB		0181			
[20] Ground connector	435HB		5004			
[21] Ground connector	153BB		0191			

Component Identification
Table 101

R HYDRAULIC TANK PRESSURIZING SYSTEM - SERVICING

1. General

R 2. Tank Pressurization Using an External Air Source

A. Equipment and Materials

DESCRIPTION	PART NO.
R Hydraulic Tank Pressurizing Equipment (Air Bottle with Pressure Reducing Valve, or Air Compressor Able to Provide 4.5 bars (65 p.s.i.) Pressure and Equipped with Air Purifier and Pressure Reducing Valve).	
Access Platform	
Air/Hydraulic Tool Kit.	

B. Prepare.

R (1) Open access door 153BB under fuselage for access to ground connector.

R C. Pressurize (Ref. Fig. 301)

(1) Remove blanking cap from ground connector (0191).

(2) Connect pressurizing equipment to connector.

R (3) Pressurize tanks to 4.5 bars (65 psi) (pressure to be
R read on pressure indicator of each tank).

R D. Stop Pressurization.

R (1) Discontinue pressurizing tanks.

(2) Disconnect pressurizing equipment.

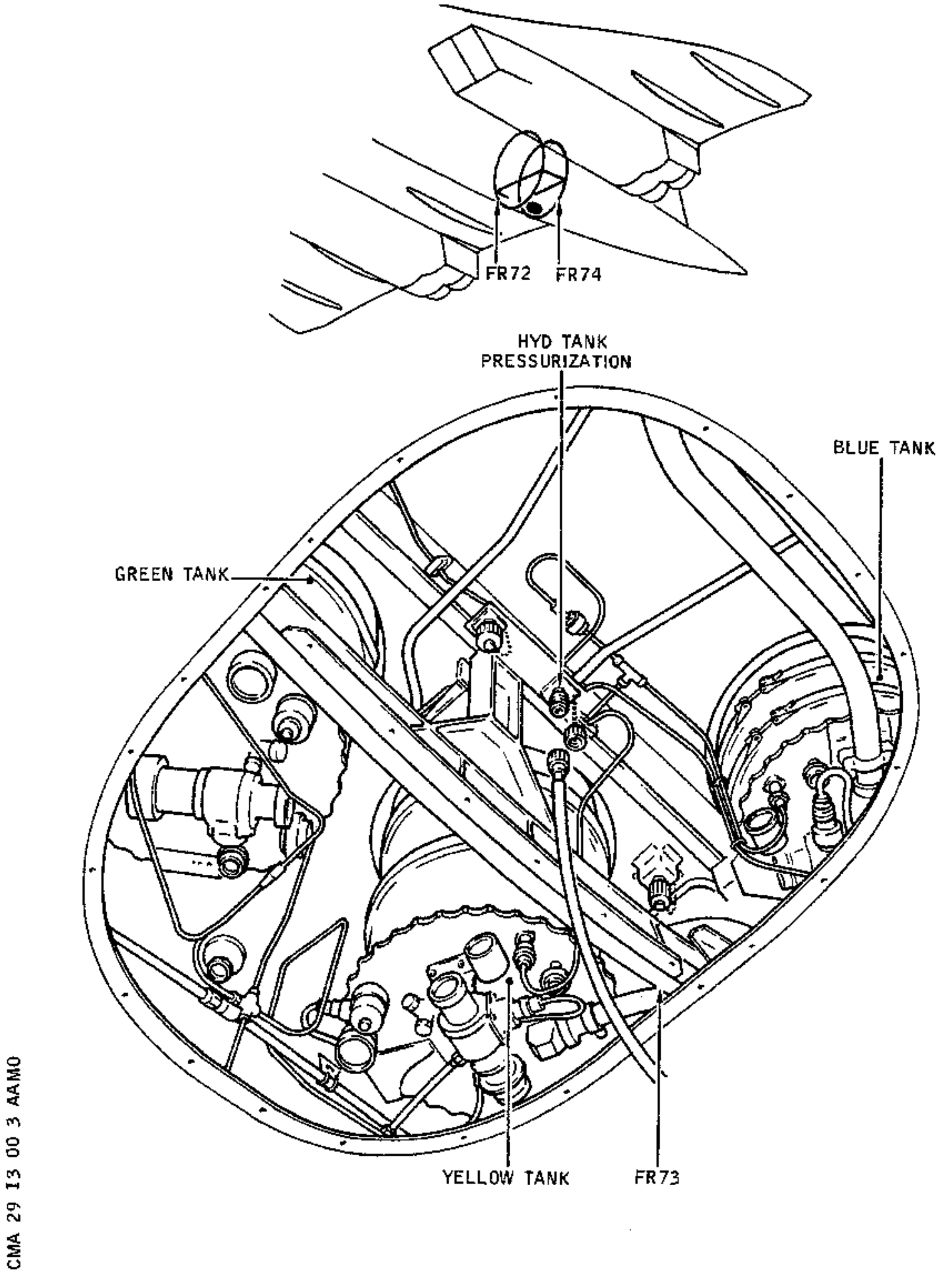
R (3) Re-install blanking cap on connector.

E. Close-Up.

(1) Close access doors.

(2) Remove access platform.

Printed in England



R Tank Pressurization Ground Connector
Figure 301

R 3. Tank Pressurization Using On-Board Air Compressor

A. Equipment and Materials.

DESCRIPTION	PART NO.
Electrical Ground Power Unit	
R R External Power	24-41-00, S

B. Prepare

R (1) Make certain that the following circuit breakers are set :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
HYD TANK AIR COMP	13-215	M 601	G 7
HYD TANK COMPR CONT	15-215	M 602	D 8

(2) Connect electrical ground power unit and energize
R the aircraft electrical network, (Ref. 24-41-00,
R Servicing).

R C. Pressurize

(1) On Flight Engineer's HYDRAULIC MANAGEMENT panel, press AIR COMPRESSOR push button.

D. Close-Up

(1) De-energize the aircraft electrical network and disconnect electrical ground power unit
R (Ref. 24-41-00, Servicing).

R 4. Tank Depressurization

R A. Equipment and Materials

DESCRIPTION	PART NO.
R Access Platform	

R B. Prepare

R (1) Open access door 153BB under fuselage.

R C. Depressurize (Ref. Fig. 302)

R (1) Remove safety pin (1) from depressurization valve/
R sightglass assembly on relevant tank.

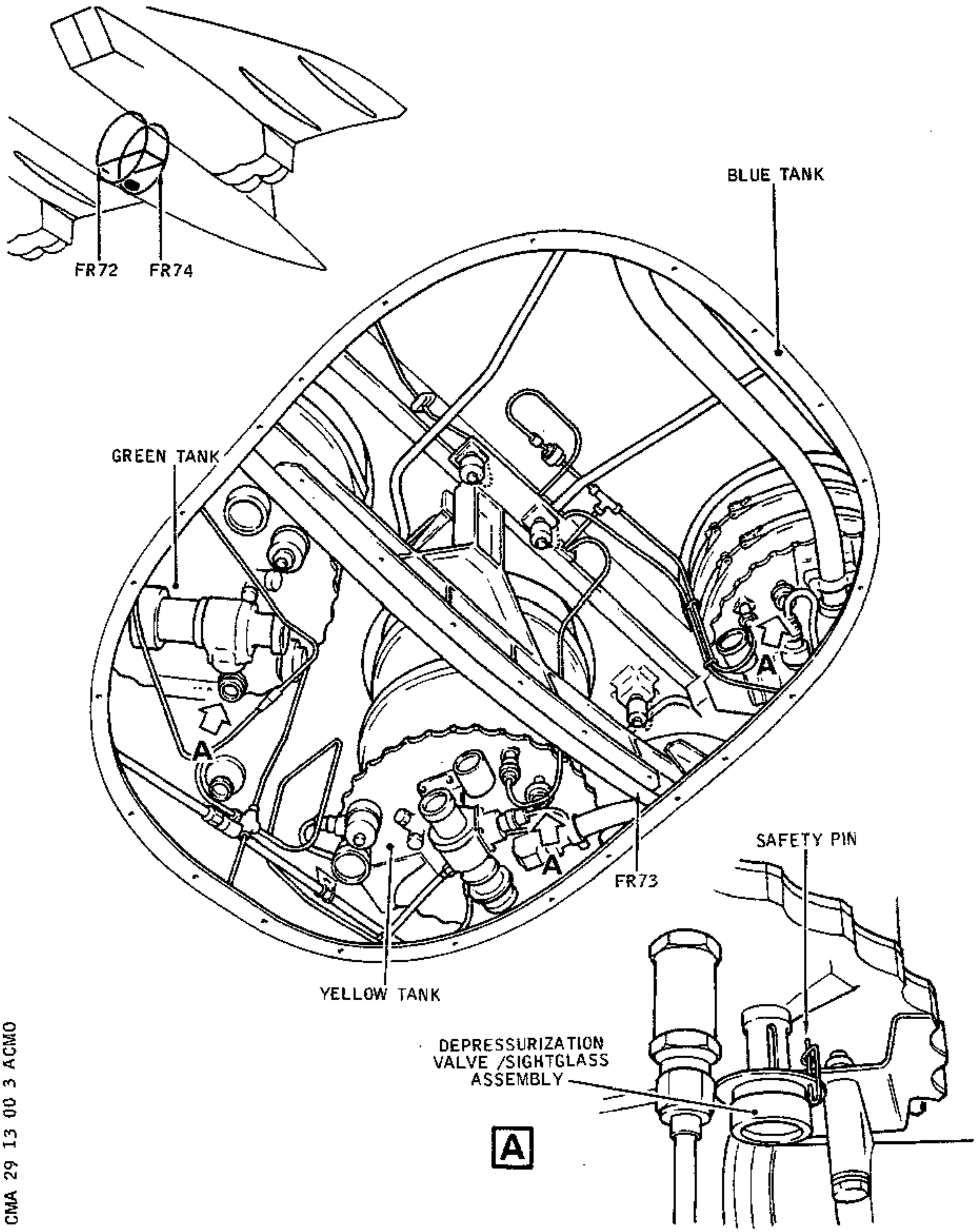
R (2) Unscrew depressurization valve/sightglass assembly a
R few turns only. Check tank depressurization on tank
R air pressure indicator.

R D. Close-Up

R (1) Screw depressurization valve/sightglass assembly (2)
R shut, and secure with safety pin (1).

R (2) Close access door.

R (3) Remove access platform.



R Tank Depressurization Valve/Sightglass Assembly
Figure 302

HYDRAULIC TANK PRESSURIZING SYSTEM - ADJUSTMENT/TEST

WARNING : MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN PLACE.

1. General

2. Functional Test

The object of this test is to check for correct operation of the hydraulic tank pressurizing system.

A. Equipment and Materials

DESCRIPTION	PART NO.
Hydraulic Tank Pressurizing Equipment (air bottle with pressure reducing valve)	
Access Platform - 9 ft. 8 in. (2.96 metres)	
Electrical Ground Power Unit	
Stop Watch	
Voltmeter	

R

B. Prepare

(1) Open access door 153BB under fuselage.

(2) Open engine access doors 415 HB and 435 HB (Ref. 71-00-00, Servicing).

(3) Check that the amount of hydraulic fluid contained in each hydraulic tank is between the minimum and normal level (Ref. 12-12-29).

(4) Depressurize the three tanks by opening associated depressurization valves (Ref. Servicing).

(5) Close depressurization valves when pressure in the three tanks is nil.

(6) Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing)

(7) Check that the following circuit breakers are set :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
HYD TANK AIR COMP	13-215	M 601	G 7
HYD TANK COMPR CONT	15-215	M 602	D 8

C. Normal Pressurization Test

(1) Pressurize tanks using No.3 engine ground connector (5004) and vary the pressure between 72.519 and 136.336 psi. (5 and 9.4 bars).

- Record pressure in the three tanks as read on pressure indicators (0104), (0204) and (0304) on Green, Blue and Yellow tanks respectively.

- Check that with no air flow other than the external leakage through the pressure reducing valve nozzle, the pressure in each of the three tanks is 65 + 2 -4 psi (4.5 + 0.15 - 0.25 bars).

(2) Depressurize the three tanks by opening associated depressurization valves.

(3) Close depressurization valves when pressure in the three tanks is nil.

(4) Connect pressurizing equipment to No.1 engine ground connector (0181), pressurize the tanks and repeat test described in para. C (1) above.

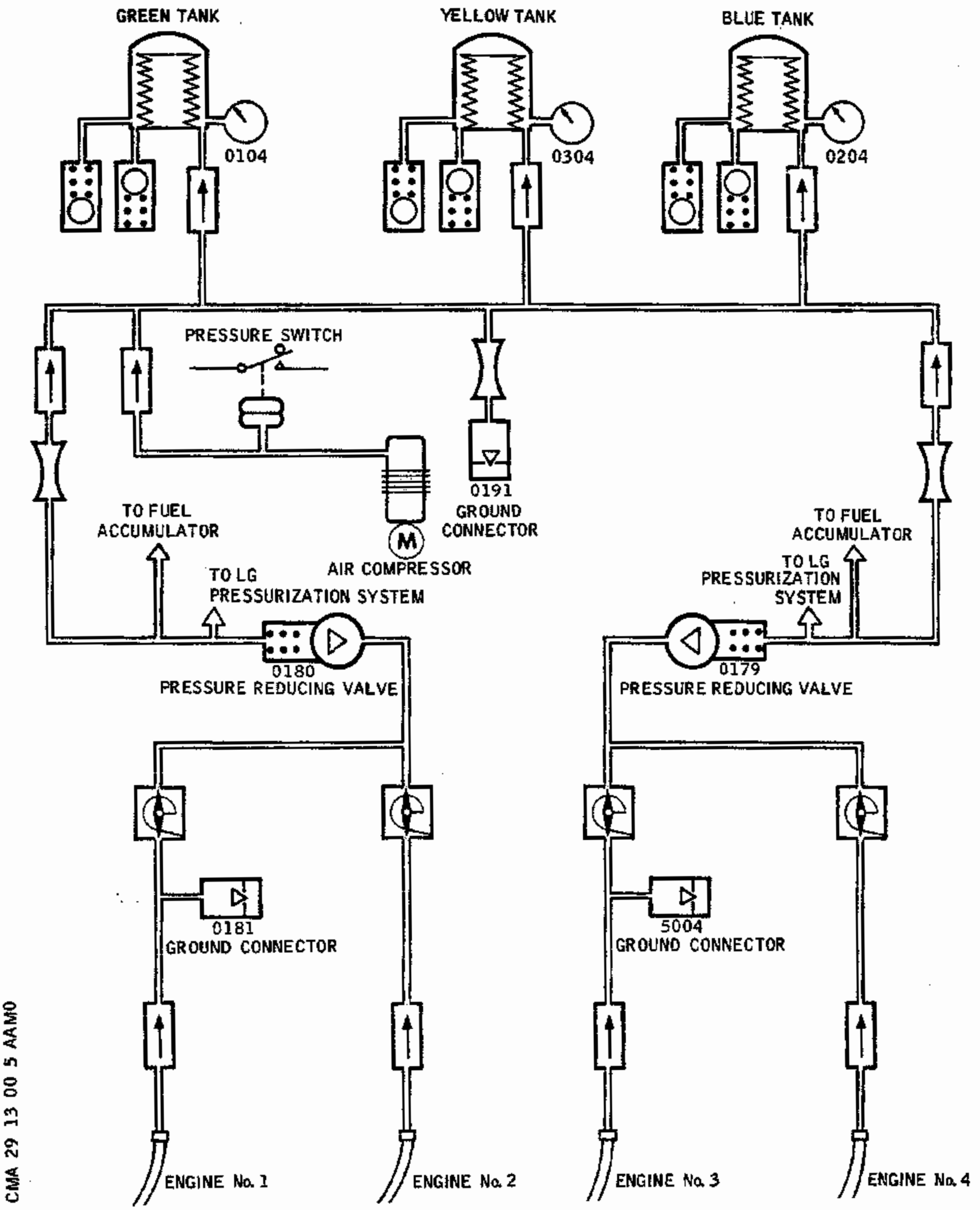
D. Overpressure Test

(1) Connect pressurizing equipment to ground connector 0191 (zone 153).

(2) Apply pressure, varying the pressure between 58 and 87 psi (4 and 6 bars).

- Record pressure in the three tanks as read on pressure indicators (0104), (0204) and (0304) on Green, Blue and Yellow tanks respectively. The pressure in each tank must stabilize at 69.60 psi (4.8 bars).

E. Pressuration Test Using Aircraft Air Compressor



Hydraulic Tank Pressurizing System
Figure 501

R

On Flight Engineer's HYDRAULIC MANAGEMENT panel press AIR COMPRESSOR push button and start stop-watch. Release AIR COMPRESSOR push button.

The compressor must stop when the pressure reading on each tank pressure indicator reaches 48.6 ± 3 psi (3.35 ± 0.2 bars). The operating time of the compressor must not exceed 2 minutes 45 seconds.

CAUTION : ON NO ACCOUNT MUST THE COMPRESSOR OPERATE CONTINUOUSLY FOR MORE THAN 3 MINUTES. IF IT HAS NOT STOPPED AFTER 2 MINUTES 45 SECONDS, TRIP CIRCUIT BREAKER M601 ON PANEL 13-215, MAP REF, G 7.

F. Timing Test

(1) Depressurize the three tanks by opening associated depressurization valves.

(2) Trip, safety and tag circuit breaker M601 (Map Ref. G 7) on panel 13-215.

(3) Disconnect plug M607A on compressor electric motor.

(4) Connect a voltmeter to pins J and K of connector plug.

(5) Remove safety clip and tag, and reset circuit breaker M601 on panel 13-215.

(6) On Flight Engineer's HYDRAULIC MANAGEMENT panel, press AIR COMPRESSOR push-button and start stop-watch. Release push-button.

- The voltmeter must indicate 200 Volts.
- After 2 minutes 45 seconds the voltmeter must indicate zero voltage.

(7) Connect plug M607A to compressor electric motor.

G. Close-Up

(1) Disconnect hydraulic tank pressurizing equipment.

(2) Re-install ground connector caps.

(3) De-energize the aircraft electrical network and disconnect electrical ground power unit (Ref. 24-41-00, Servicing).

(4) Close depressurization valves on the three tanks, and

secure with safety pins.

(5) Close access doors.

(6) Close doors on engines 1 and 3 (Ref. 71-00-00, Servicing).

(7) Remove access platform.

THERMAL SHUT-OFF VALVES - REMOVAL/INSTALLATION

1. General

The thermal shut-off valves shut off the supply of pressurizing air to the hydraulic tanks when the temperature sensed is above 210°C. There are 4 valves, one on the pressurization line from each engine. They are located in the upper part of the wing.

A. Equipment and Materials

DESCRIPTION	PART NO.
Wing Protective Mat	
Access Platforms - 13ft. 7in. (4.06 metres)	
Corrosion-Resistant Steel Lockwire. Condition A, Dia.0.818mm (0.032 in).	
Compressed Air Supply Unit with Pressure Reducing Valve.	

B. Prepare

(1) Position wing protective mats.

(2) Open access doors associated with thermal shut-off valves to be removed :

Engine 1 shut-off valve : 534ET
Engine 2 shut-off valve : 533FT
Engine 3 shut-off valve : 633FT
Engine 4 shut-off valve : 634ET

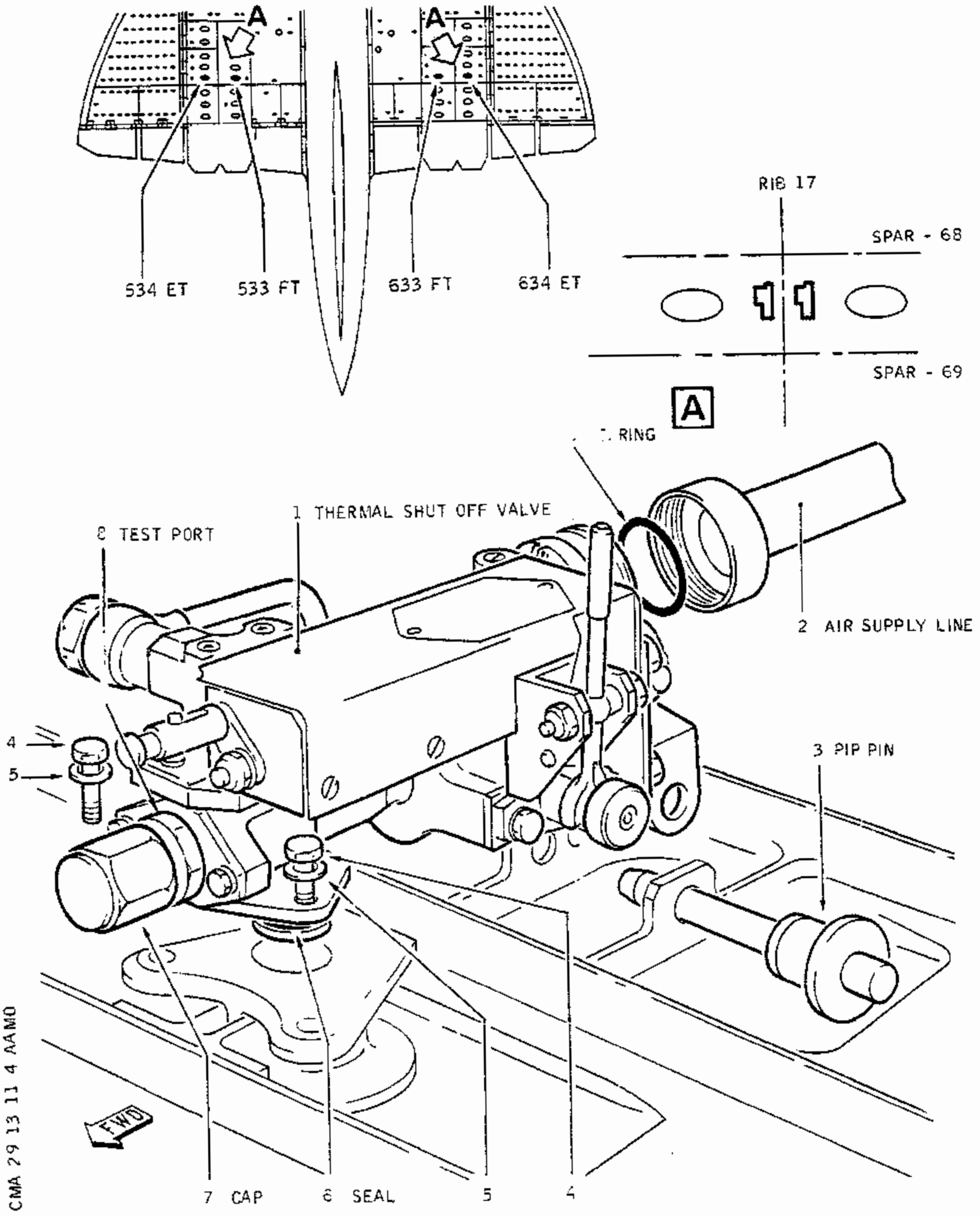
C. Remove

(1) Cut and remove lockwire, disconnect air supply line (2), remove and discard O-ring (9).

(2) Remove bolts (4) and washers (5).

(3) Remove pip pin (3). Press plunger in centre of head to disengage locking balls.

(4) Lift up valve (1) to remove.



Thermal Shut-Off Valve
Figure 401

R

Printed in England

D. Preparation of Replacement Component

E. Installation

(1) Position thermal shut-off valve (1).

CAUTION : DO NOT DAMAGE SEAL (6).

(2) Install bolts (4) together with washers (5). Tighten bolts.

(3) Install pip pin (3).

R (4) Install O-ring (9), connect and tighten air supply line (2). Wirelock.

F. Tests

(1) Remove cap (7).

(2) Connect to test port (8) a compressed air supply unit with pressure reducing valve.

(3) Open compressed air unit, increase pressure to 2.5 bars (36.2 psi), and check for leakage at unions.

(4) Close compressed air unit, and disconnect.

(5) Install cap (7) on test port (8).

G. Close-Up

(1) Make certain working area is clean and clear of tools and miscellaneous items of equipment.

(2) Close access doors.

(3) Remove protective mats from wing, and access platform.

RESERVOIR PRESSURIZATION THERMAL SHUT-OFF VALVES - ADJUSTMENT/TEST

1. General

The object of the thermal shut-off valves is to cut off the supply of pressurization air to the reservoirs when its temperature exceeds 210°C (410°F).

2. Functional Test

This test checks the serviceability of the four thermal shut-off valves (one for each supply system).

A. Equipment and Materials

DESCRIPTION	PART NO.
Compressed Air Supply Unit, with Pressure Reducing Valve	
Pressure Gauge, reading from 0 to 5 bars	
Wing Protective Mats	
Access Platform - 12 ft.6 in. (3.850 metres)	

B. Prepare

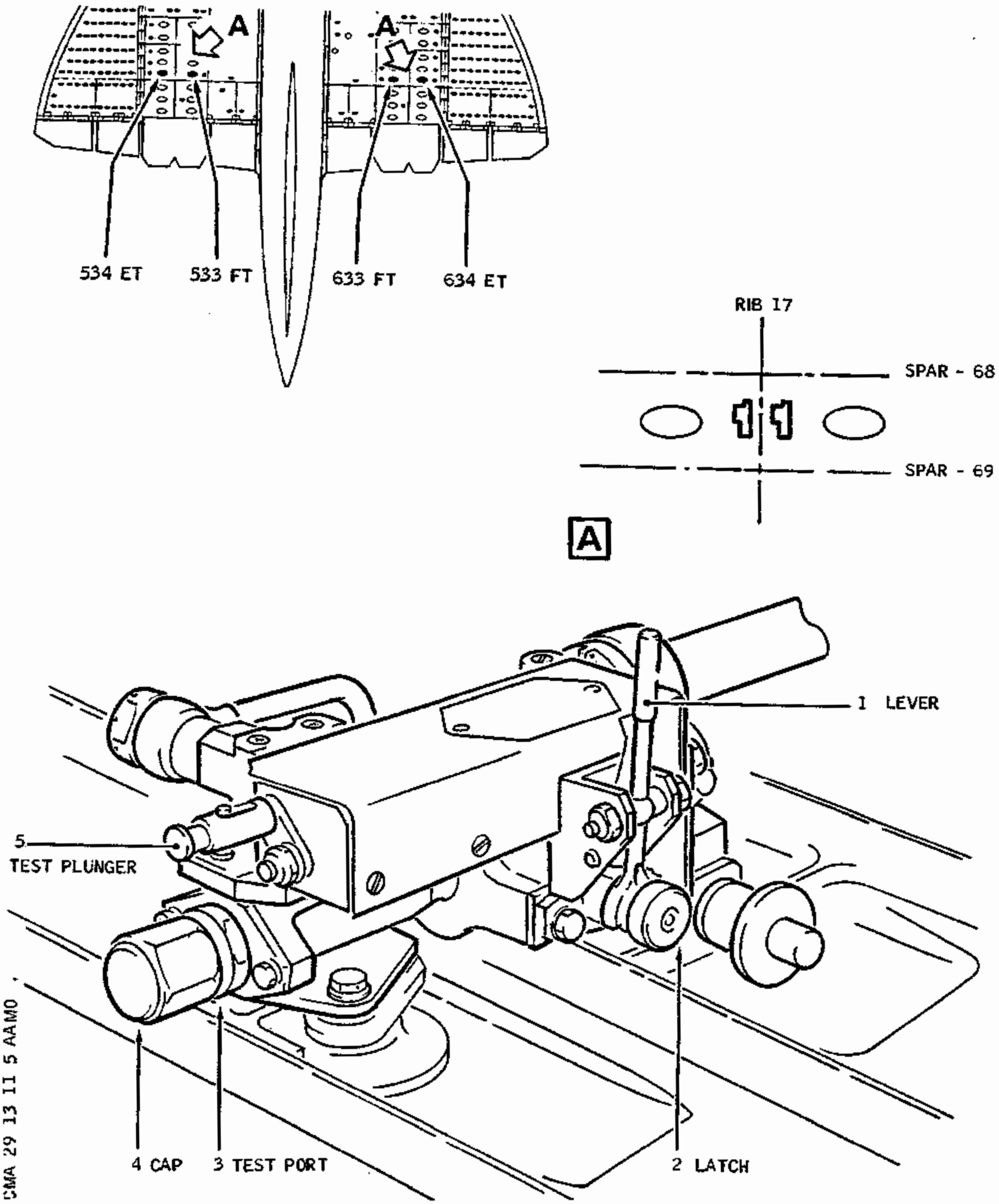
(1) Open access doors 534ET, 533FT, 633FT, and 634ET on wing upper surface.

C. Test

NOTE : Before testing valve, check position of latch (2). If latch is pushed fully in, valve is locked in shut position. If test is not due to valve replacement, look for cause of overheating. If test follows valve replacement push lever (1) to reset valve in operating position : (resetting travel is approximately 4 mm). In order to test the valve its temperature must be below 100°C (212°F).

(1) Remove blanking cap (4) from test port (3) and connect up compressed air supply unit equipped with pressure reducing valve and pressure gauge.

(2) Open compressed air supply unit, set to a pressure of



Thermal Shut-Off Valve
Figure 501

approximately 1.3 bars.

(3) Press test plunger (5).

(4) Latch (2) must engage (move inwards by about 4 mm).

(5) Shut down compressed air supply unit, and disconnect it from test port (3).

(6) Return lever (1) to arming position.

(7) Install and tighten blanking cap (4) on test port (3).

D. Close-Up

(1) Close access doors.

(2) Remove wing protective mats.

(3) Remove access platform.

RESERVOIR PRESSURIZATION THERMAL SHUT-OFF VALVES - INSPECTION/CHECK

1. General

Check of the operating condition of the thermal shut-off valve.

2. Reservoir Pressurization Thermal Shut-Off Valve

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platforms - 12 ft.6 in. (3.85 metres)	
Wing Protective Mat	

B. Prepare

(1) Position access platforms.

(2) Open access doors 534ET, 533FT, 633FT and 634ET.

C. Check

(1) Check position of latch on each valve.

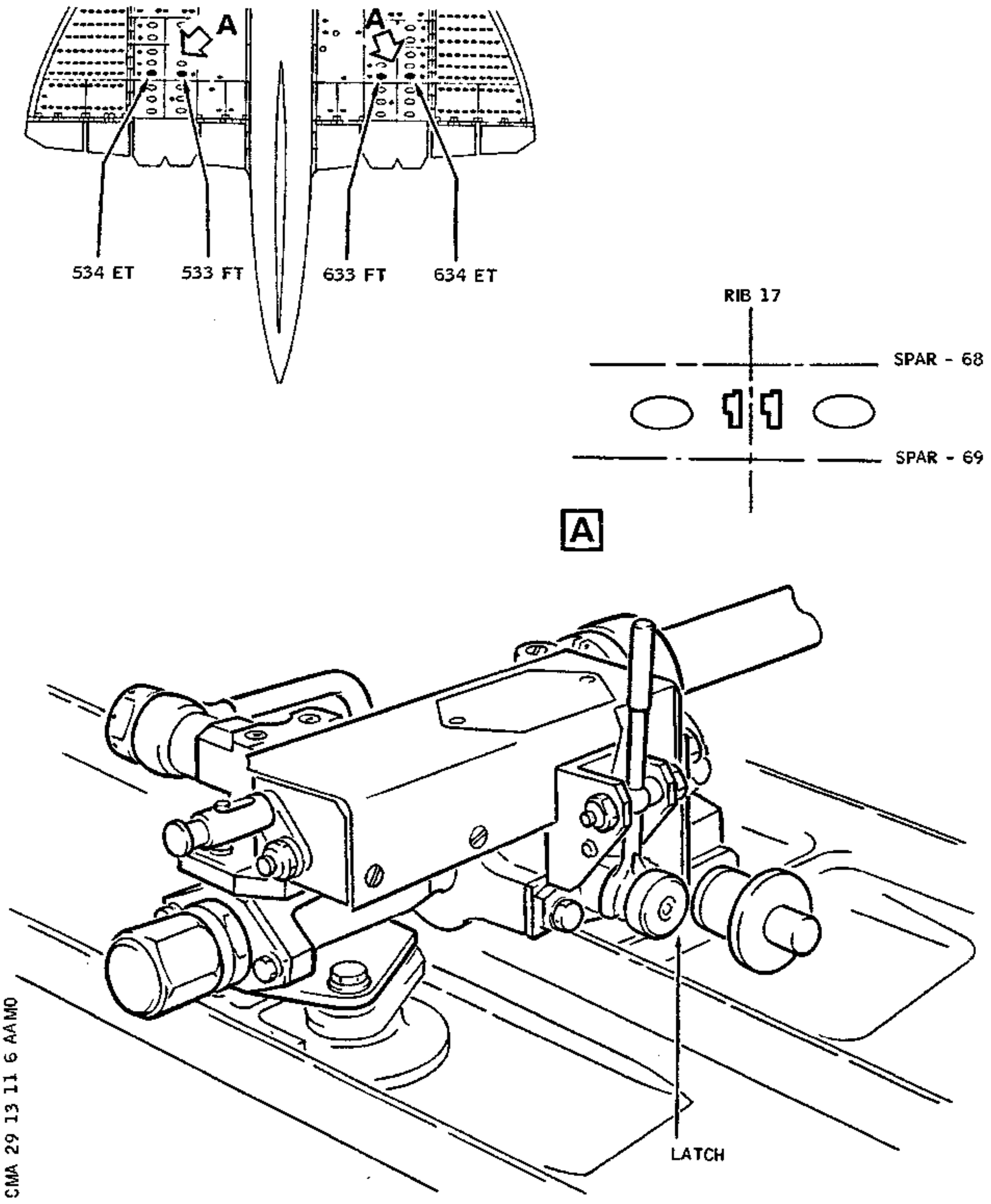
(a) If latch is extended, the valve is open and in its normal operating position.

(b) If latch is engaged (fully in), the valve is locked in the closed position.
Trouble shoot before re-arming valve.

(2) Check that valves are securely mounted.

D. Close-Up

Close access doors
Remove access platforms.



Location of Thermal Shut-Off Valves
Figure 601

AIR ELECTRO-COMPRESSOR - REMOVAL/INSTALLATION

1. General

   A. Removal for Replacement

2. Compressor

   A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform 9 ft 8 in. (2.96 meters)	

   B. Prepare

      (1) Position access platform.

      (2) Open access door 153BB under fuselage.

      (3) Trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
HYD TANK AIR COMP	13-215	M 601	G 7
HYD TANK COMPR CONT	15-215	M 602	D 8

      (4) Place a warning notice in flight compartment.

   C. Remove

      (1) Disconnect pipe (2).

      (2) Disconnect electrical connector (1).

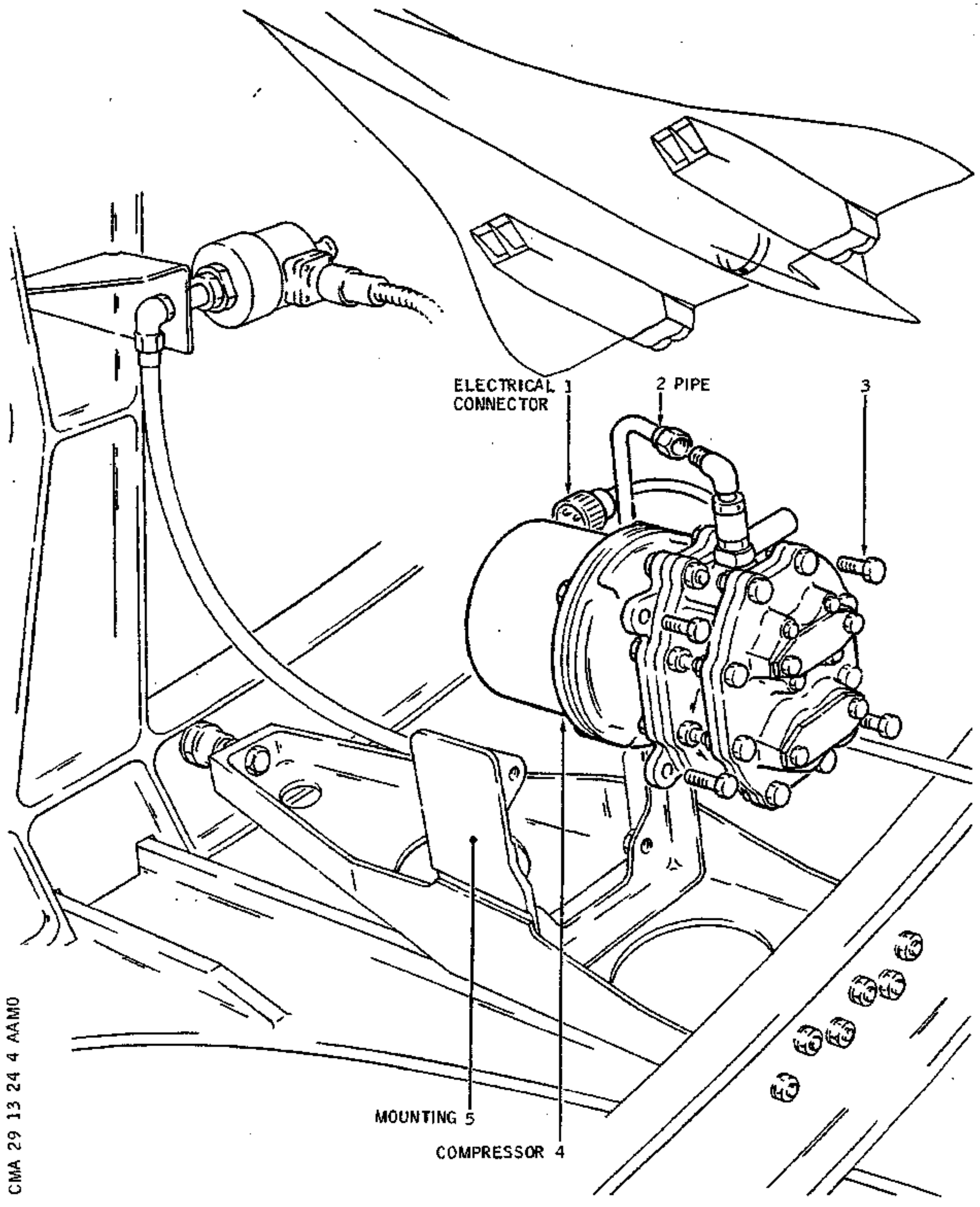
      (3) Remove and retain screws (3) and washers.

      (4) Remove compressor (4).

      (5) Cap open line end, and compressor port.

   D. Preparation of Replacement Component

   E. Install



Electro-Compressor
Figure 401

(1) Remove blanking caps.

(2) Position compressor (4) on mounting (5).

(3) Install screws (3) with washers.

(4) Tighten screws (1).

(5) Connect pipe (2) to compressor and tighten.

(6) Connect electrical connector (1).

F. Test

(Ref. Operational test 29-13-00 A/T).

G. Close-Up

(1) Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(2) Remove safety clips and tags and reset circuit breakers

(3) Close access doors.

(4) Remove warning notice from flight compartment.

(5) Remove access platform.

1. General

A. Auxiliary hydraulic power is provided by :

- A Yellow system
- An ultimate emergency system pressurized by a ram air turbine.
- A ground pressurizing system

The Yellow system replaces the Green or Blue System, if either of these fails, thus ensuring continuity in the operation of the main services. The system is completely independent. Fluid is supplied from a pressurized reservoir, and the system has its own control and indicating components.

The Ram Air Turbine (RAT) system pressurizes the Green and Yellow systems in the event of failure of the four engines. It is supplied by the Green and Yellow reservoirs.
The ground pressurizing system pressurizes the Green, Blue and Yellow systems through selectors. It is supplied by the associated reservoirs.

RB CAUTION : AEROSHELL 16 MUST BE USED INSTEAD OF AEROSHELL 7.

RB NOTE : Aeroshell Grease 16 has a higher maximum operating
RB temperature than Aeroshell Grease 7.

YELLOW SYSTEM - DESCRIPTION AND OPERATION

1. General

The Yellow system takes over from the Green or Blue systems in an emergency. Like the main systems, it has a tank pressurized to 65 psi (4.5 bars), which supplies two self-regulating pumps with hydraulic fluid. These pumps are driven by the accessory gearboxes of engines 2 and 4. They have a nominal output of 17.18 US Gal per minute (65 litres per minute), and can be depressurized.

In an emergency, the system supplies power to the following services and user systems:

A. When replacing the Green system:

- The half-body of each PFCU
- The half-body of each relay jack
- The landing gear extension system for:
  - Main landing gear and doors
  - Nose landing gear and doors
  - Tail landing gear
- The nose wheel steering system
- The brakes
- The droop nose and visor lowering system
- The hydraulic actuators operating the ramps and spill doors of engines 1 and 2.

B. When replacing the Blue system:

- The half-body of each PFCU
- The half-body of each relay jack
- The hydraulic actuators operating the ramps and spill door of engines 3 and 4.

C. Services supplied only by the Yellow system:

- Emergency braking and parking system.

2. Description

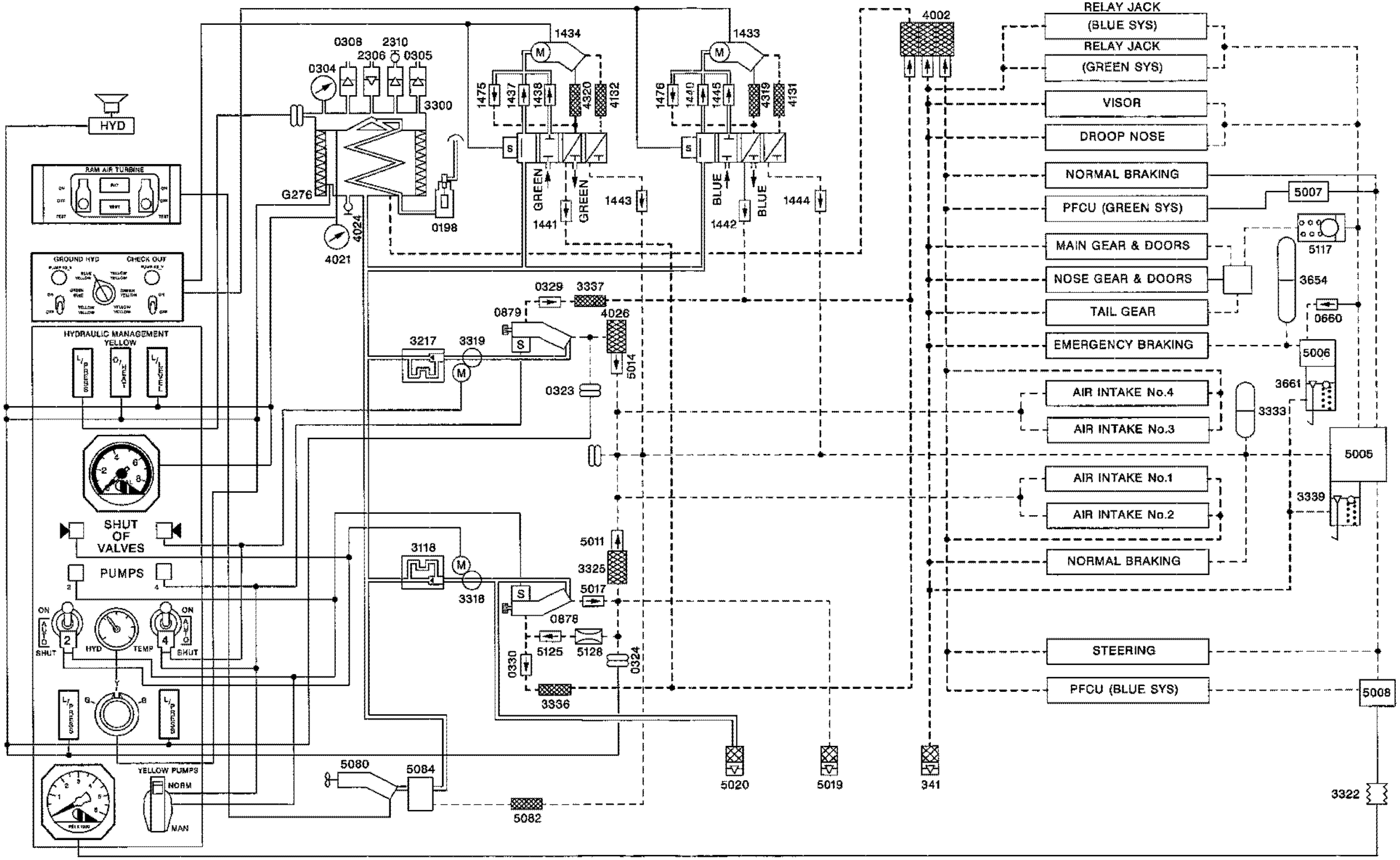
R ON A/C 001-006 (Ref. Fig.001)
R ON A/C 007-007 (Ref. Fig. 001A)

A. The Yellow system includes the following components:

- One hydraulic tank assembly (3300)
- One tank de-aerator safety valve (0198)
- Two heat exchangers (3118) and (3217)

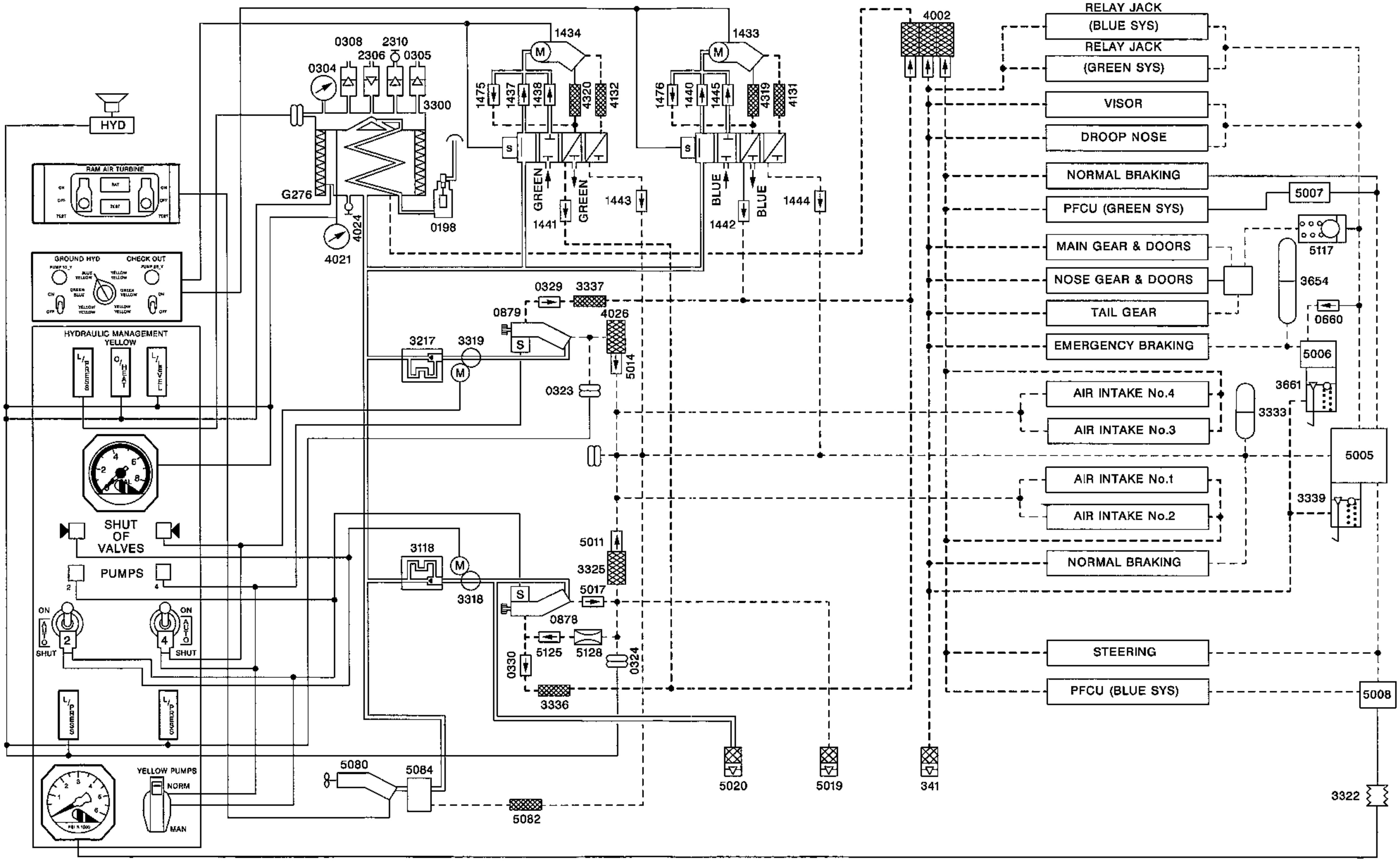
INTENTIONALLY BLANK

PRINTED IN ENGLAND



Yellow System
Figure 001

PRINTED IN ENGLAND



Yellow System
Figure 001A

- Two shut-off valves (3318) and (3319)
- Two self-regulating engine-driven pumps (0878) and (0879)
- Non return valve (5017)
- Two low pressure switches (0324) and (0323)
- A restrictor (5128)
- Non return valve (5125)
- Two HP micronic filters (3325) and (4026)
- Two HP filter mounting plates (5011) and (5014)
- Pressure switch (5060) (air intake monitoring)
- Two non return valves (1443) and (1444)
- Blue/Yellow system HP manifold (5005)
- Pressure relief and manual unloading valve (3339)
- Thermal pressure relief and manual unloading valve (3661)
- Accumulator (3333)
- Pressure transmitter (3322)
- Green/Yellow system HP manifold (5006)
- Priority valve (5117)
- Servo control unit Blue/Yellow system manifold (5008)
- Servo control unit Green/Yellow system manifold (5007)
- (For reference) : Emergency brake system HP aft non return valve (0660)
- Two LP non return valves (0330) and (0329)
- Two case drain filters (3336) and (3337)
- Two non-return valves (1441) and (1442)
- Tank return filter (3-micron) (4002)
- Two system pressurization ground connectors (5019) and (5020)
- Tank ground filling connector (341)

3. Tank Assembly
R (Ref. Fig. 002)

The Yellow hydraulic tank contains the fluid required by the pumps to provide the power necessary for operation of the various aircraft systems.

R

After SB 29-050 For A/C 001-007,

A. Leading Particulars

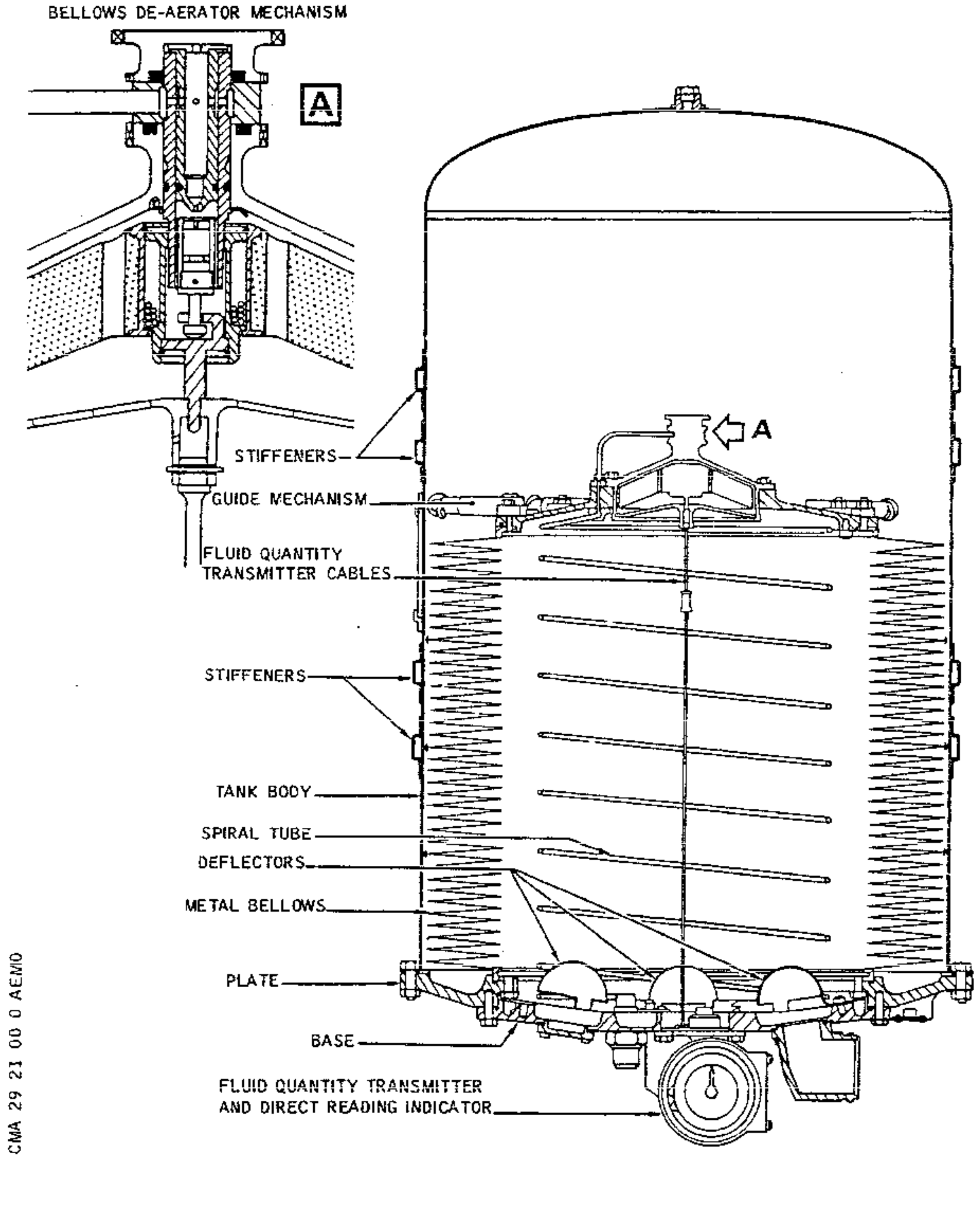
Maximum capacity 9 US Gal (7.5 Imp Gal, 34 litres).

Normal fill level 6.6 US Gal (5.5 Imp Gal, 25 litres).

First warning level 3.4 US Gal (2.9 Imp Gal, 13 litres).

Second warning level 2.2 US Gal (1.9 Imp Gal, 8.5 litres).

No account is taken of the amount of fluid contained in the bellows when compressed.



R Yellow Tank Assembly
Figure 002

The amount of fluid not indicated on the indicator is 0.9 US Gal (0.747 Imp. Gal, 3.4 litres)

R B. Description (Ref. Fig. 003)

(1) The tank consists of :

(a) A cylindrical body strengthened by four external stiffeners, and closed at the top by a welded cover and at the base by a bolted plate supporting the bellows.

(b) A metal bellows fitted with guides. The hydraulic fluid is contained inside the bellows, whilst pressurizing air acts on the outside.

(2) The following components are mounted on the tank :

(a) A de-aerator connected to ambient by a spiral tube.

(b) Fluid quantity transmitter (4021) with a direct reading indicator.

(c) Pressurization non-return valve (0305).

(d) Direct reading air pressure indicator (0304).

(e) Low pressure switch (2307) (air pressure).

(f) Air pressure relief valve (2306).

(g) Vacuum relief valve (0308).

(h) Depressurization valve/sightglass (2310).

(i) Drain valve (4024).

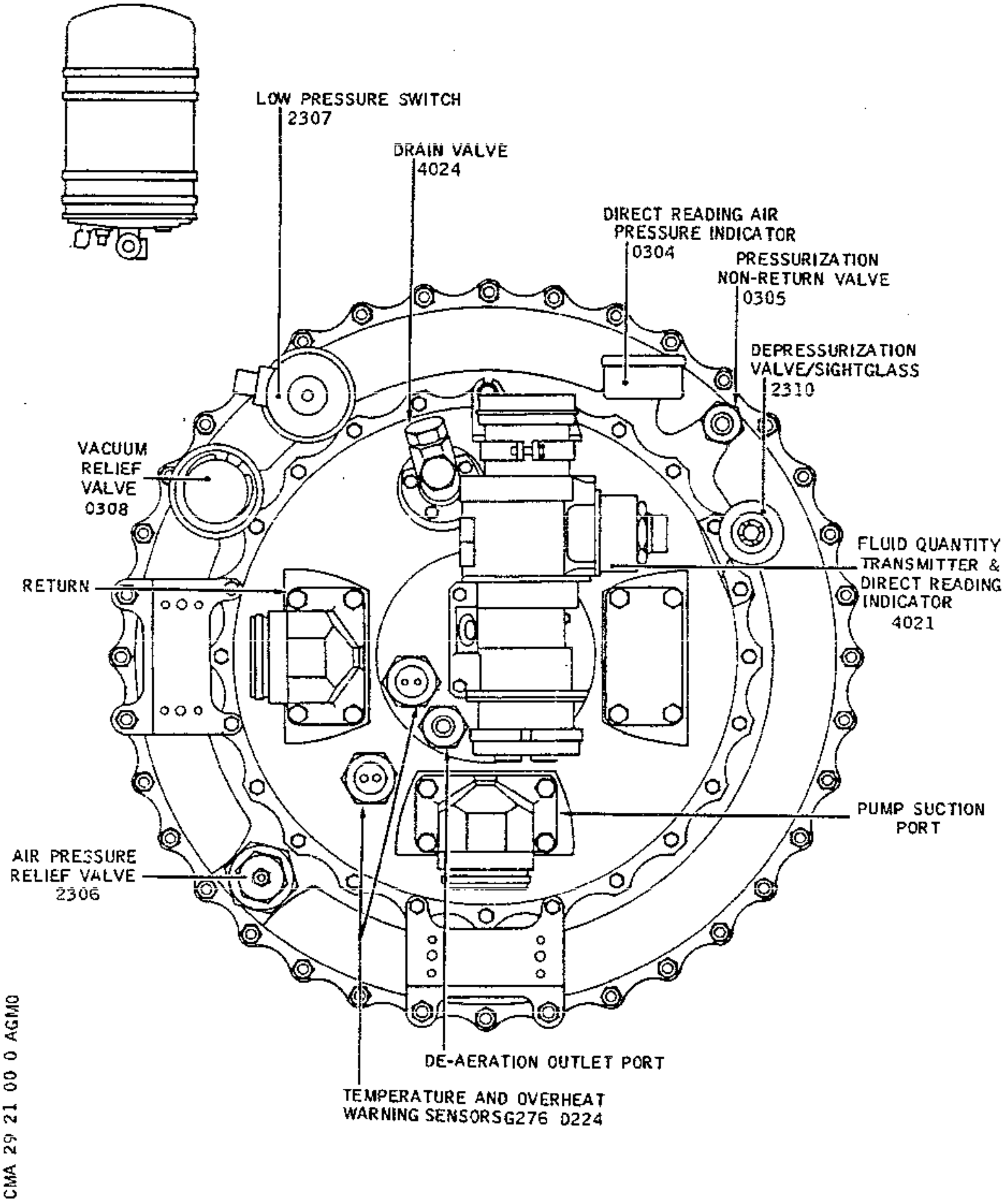
(j) Overheat warning sensor (G276).

(k) Temperature sensor (D224).

C. Operation

(1) Pressurizing air acts upon the outside of the bellows which contains the hydraulic fluid.

As the air and fluid are separated, fluid contamination, emulsion or oxidation is avoided.



R Yellow Tank Components
Figure 003

(2) The tank is filled or topped up by means of a hydraulic ground unit connected into a tank return line by a quick-disconnect self-sealing ground connector. The fluid is filtered before entering the bellows.

(3) A de-aerator mounted at the top of the bellows, and connected to the bottom of the tank and then to a de-aerator safety valve by a spiral tube, provides continuous evacuation through the tube of any air which may enter the bellows.

R

(4) A fluid quantity transmitter and direct reading indicator assembly allows :

- Direct reading of the quantity of fluid in the tank.
- Electrical transmission to the quantity indicator on the Flight Engineer's panel.
- Control of a microswitch which, when the first warning level is reached :
  - Illuminates L/LEVEL warning light on the Flight Engineer's panel
  - Illuminates HYD warning light on the master warning panel
  - Triggers the aural warning gong
  - Shuts off the emergency supply to the Yellow/ Green or Yellow/Blue servo control units (PFCU and relay jack Yellow selector solenoids).
  - Shuts off Yellow pressure supply to the emergency braking system with anti-skid.
- Control of a second microswitch which cuts off the air intake hydraulic power supply when the second warning level is reached.
- Discharge of any excess hydraulic fluid in the tank.

A cable connecting the internal mechanism of the quantity indicator to the top of the bellows transmits bellows movement to the indicator.

(5) Pressurizing air is admitted to the tank through a non-return valve.

(6) A low pressure switch calibrated to 29 ± 1.45 psi (2 ± 0.1 bars) controls the L/PRESS warning light on the Flight Engineer's panel.

(7) A pressure indicator gives a direct reading of tank air pressure.

Printed in England

(8) A pressure relief valve allows any excess air, which could create tank overpressure, to be vented to ambient.

(9) A vacuum relief valve opens when the pressure differential between the tank and outside pressure reaches 0.34 psi (23 mbars).

(10) A depressurization valve and sightglass assembly permits :

- Drainage of condensation water.
- Checking of the bellows for leakage by making certain that there is no fluid in the air compartment.
- Depressurization of the tank by rotating the knurled control knob.

(11) The tank can be drained through a drain valve.

(12) In the event of fluid overheat, a temperature sensor illuminates the O/HEAT caption light on the Flight Engineer's panel and the HYD warning light on the master warning panel, and also triggers the aural warning gong.

(13) A second sensor transmits hydraulic fluid temperature information to the Flight Engineer's panel.

4. Heat Exchangers
R (Ref. Fig. 004)

A. General

During flight, heat is generated in the hydraulic system due to internal leakages. To maintain system fluid at an acceptable temperature, it is cooled in hydraulic fluid/ fuel heat exchangers.

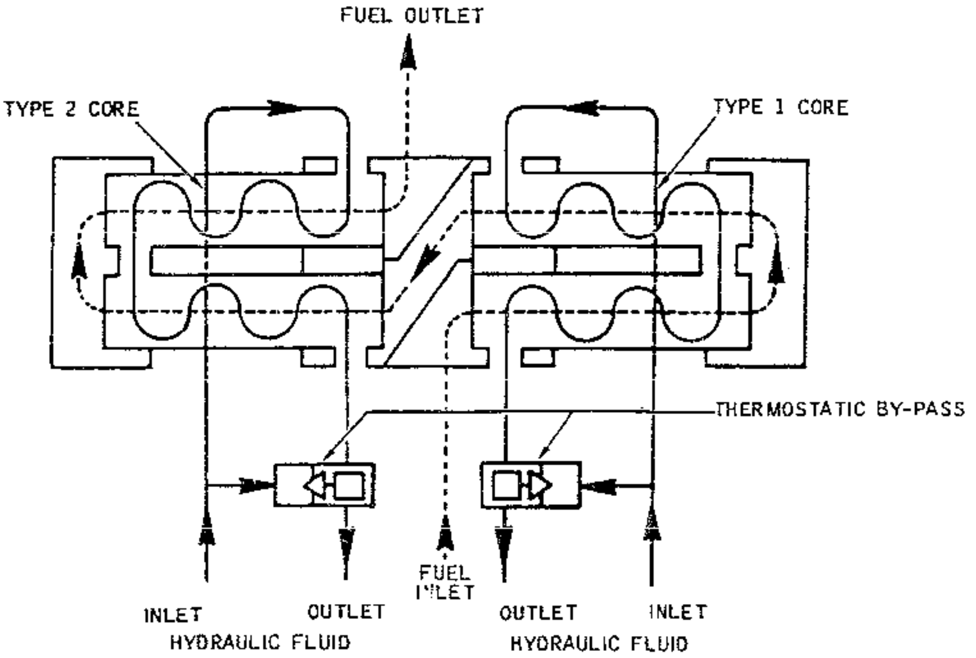
As a safety precaution hydraulic fluid in the heat exchangers is kept at a higher pressure than the fuel.

A by-pass valve on the hydraulic fluid line side opens when :

- Fluid temperature is below 140°F (60°C).
- The flow rate exceeds 9.25 US Gal/min (7.7 Imp. Gal/ min., 35 litres/min).

Yellow system hydraulic fluid is cooled by double heat exchangers. These consist of two separate exchangers which are coupled together, one connected to a main system and the other to the Yellow auxiliary system. This type of

exchanger is installed on engine 2 and 4 hydraulic pump suction lines and fuel supply lines. Each of these engines drives two pumps, one for the main and one for the auxiliary system.



CMA 29 21 00 0 ALMO

R Heat Exhanger (Type 3) Circulation Diagram
Figure 004

B. Construction of Type 3 Double Heat Exchanger

This type consists of two individual heat exchangers composed of a Type 1 and a Type 2 core, mounted on either side of a central molded support containing the fuel inlet and outlet ports, as well as those of the normal and auxiliary hydraulic systems. It is designed so as to link the core tubes in series, thus providing a single fuel system across the two core assemblies.

The other end of each core bears a cap in AU4G for fuel and hydraulic fluid transfer from one tube assembly to the other of the same core.

A by-pass fitted with a thermostatic valve with incorporated pressure relief valve, is mounted on the housing.

The core is made of two brazed light alloy tube assemblies.

5. Pumps - Engine Driven
R (Ref. Fig. 005)

A. General

Each pump contains a rotating cylinder barrel, integral with the drive shaft.
The barrel houses nine pistons bearing against a yoke by means of shoes, which are balanced hydraulically by a thin film of fluid, maintained between the shoes, admitting fluid from the system.

B. Operation

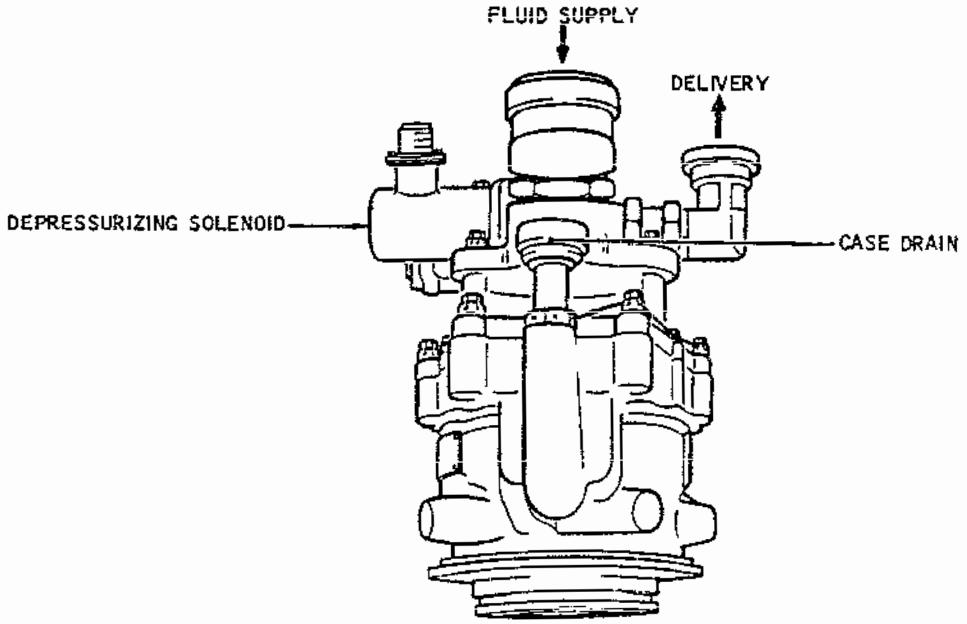
The rotation of the barrel in relation to the yoke imparts a reciprocating movement to the pistons, which draw in and discharge hydraulic fluid. The tilt angle of the yoke is controlled by an arm driven in one direction by a servo-controlled actuator piston, and in the other by a return piston.

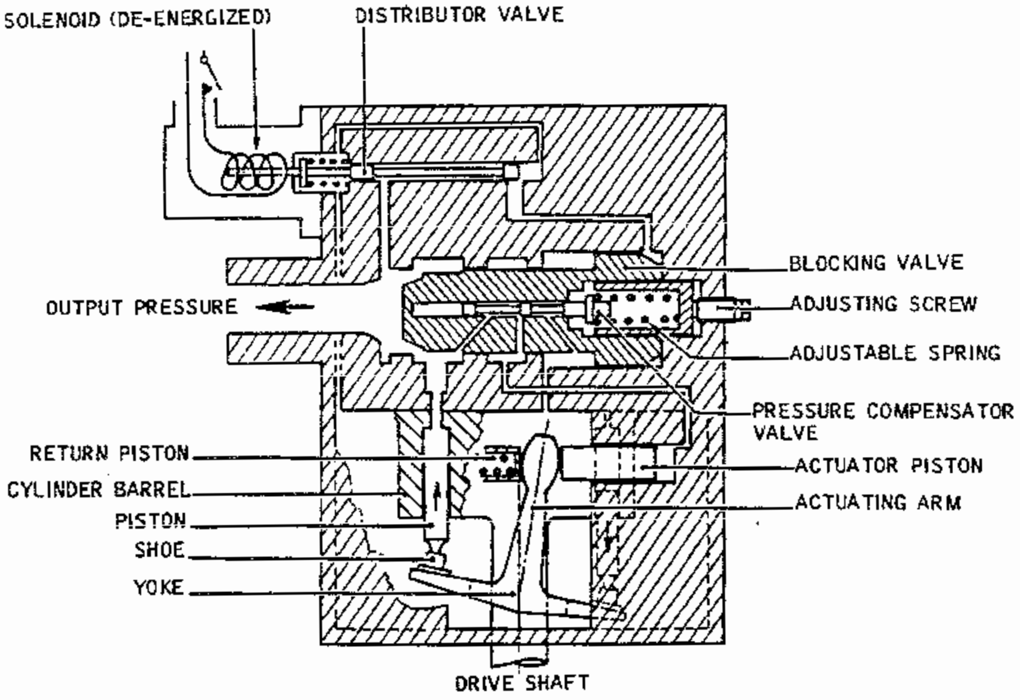
C. Regulation

Automatic regulation of delivery pressure is achieved by adapting flow to demand, while maintaining a pre-determined pressure of 4000 psi (275 bars).
Delivery pressure is applied to the slide of a pressure compensator valve, which is spring-loaded shut. The spring is adjustable. When delivery pressure exceeds the spring calibration, the compensator valve slide is displaced and pressure is admitted to the actuator piston controlling the tilt angle of the yoke.
The tilt angle is reduced, producing a consequent reduction in flow and with the result that the required delivery pressure is maintained. When delivery pressure is below spring calibration, the slide valve closes again and pressure is no longer applied to the actuator piston controlling the yoke angle. The latter is then driven back into the "maximum stroke" position by the return piston.

D. Depressurization

When the depressurizing solenoid is energized, delivery pressure is directed to the blocking valve, which closes the pressure outlet to the delivery line. Movement of this valve creates a new balance in the pressure compensator valve it contains, admitting pressure to the yoke actuator piston, and reducing pump output to zero.





CMA 29 21 00 0 ANMO

R Engine-Driven Hydraulic Pumps
Figure 005

There is no delivery into the system by the pump, but the slight pressure maintained inside it enables lubrication (return is via the case drain).

6. Filter Assy - Tank Return
R (Ref. Fig. 006)

The filter assembly, which is enclosed in a casing, filters return fluid from the various services and pump case drains.

An isolation valve in the filter enables the filter to be replaced, without the tank having to be drained.

The main filter consists of two parts :

- An outer part of pleated glass cloth, protected by two perforated plates. The filtering capability of this element, which cannot be cleaned, is 3 microns absolute.
- An inner part of nickel-plated wire mesh, of 5 microns nominal (25 microns absolute) filtering capability. This element can be cleaned.

In the event of accidental clogging, the filter element is protected by four by-pass valves, each of which is equipped with a 13-micron filter.

These valves open when the differential between inlet and outlet pressures reaches 13.05 psi (0.9 bars).

The four by-pass valve filters and the three filters on the cover, by-pass the main filter, enabling evacuation of any air which may accumulate in the filter housing.

7. Valve - Pressure Relief and Manual Unloading
R (Ref. Fig. 007)

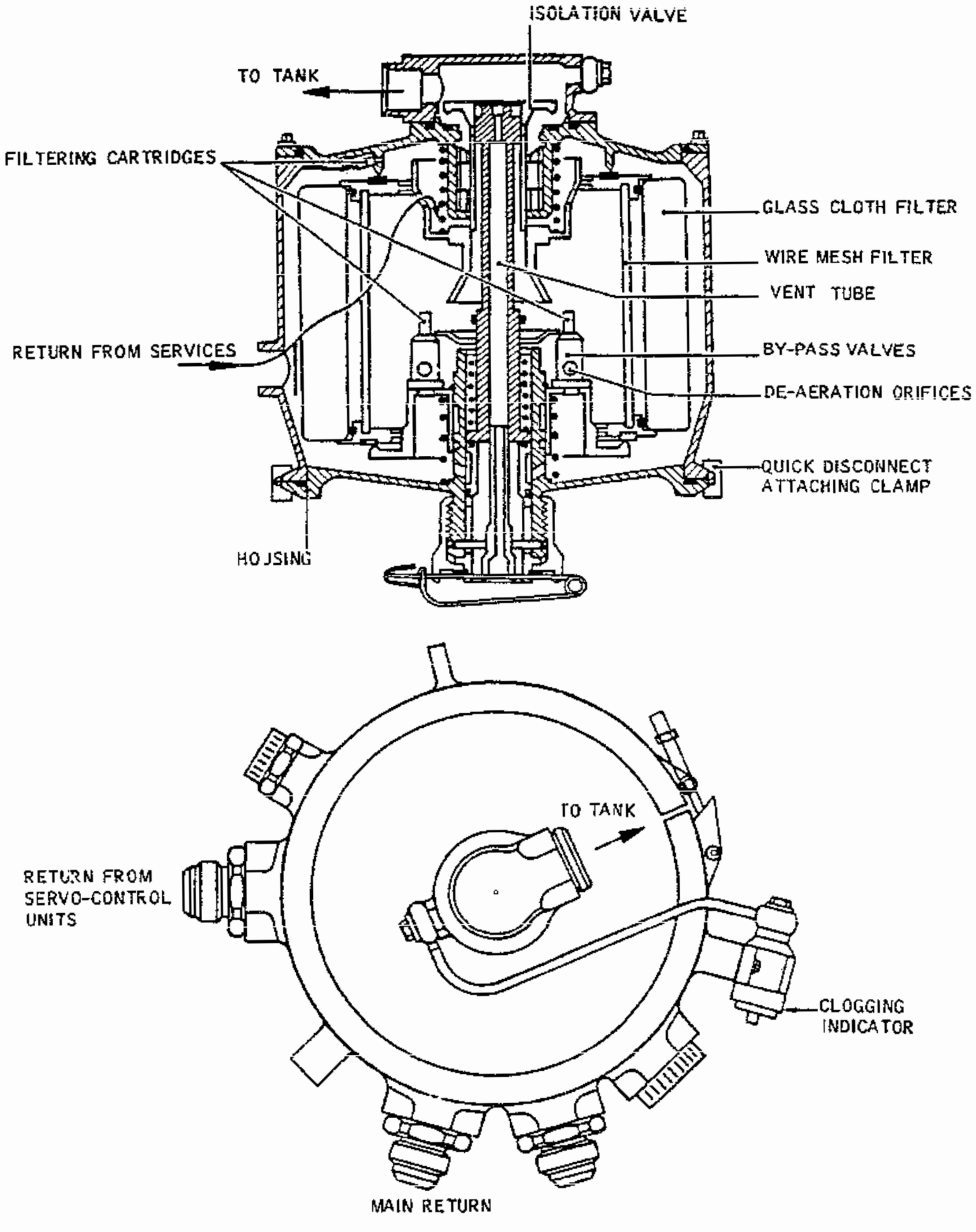
A. Description

In order to ensure smooth operation, the pressure relief valve is adjustable. It contains, in a single housing :

- A pilot slide valve assembly
- A distributor slide valve assembly

The pilot slide valve assembly is an easily removable and replaceable adjustable cartridge. Valve opening pressure is adjusted by means of an adjusting screw on the outside.

The distributor slide valve assembly consists of a sleeve in which moves a slide, controlled by a small actuating cylinder.



CMA 29 21 00 0 AQM0

Tank Return Filter Assy - Schematic-
Normal Operation
Figure 006

R

The unloading device is mounted at one end of the distributor slide valve.

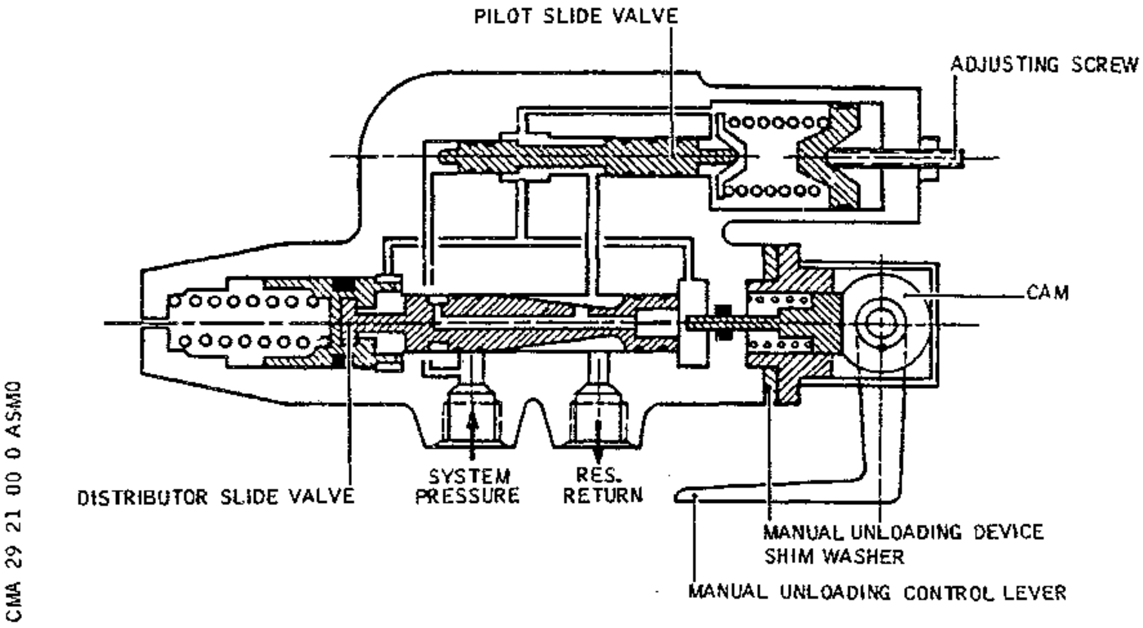
It comprises :

- A housing attached to the pressure relief valve
- A plunger piston
- A cam attached to a spindle. A control lever is attached to the protruding end of the spindle.

R B. Operation (Ref. Fig. 007)

For system pressure between 0 and 4583 psi (0 to 316 bars) (opening pressure setting) the displacement of the pilot slide valve does not allow supply to the distributor slide valve actuating cylinder. The system, under pressure, is closed.

When a pressure of 4583 psi (316 bars) is reached, the connection to the distributor slide valve opens. However, in order to ensure smooth operation of the pressure relief



Pressure Relief and Manual Unloading Valve-
Functional Diagram
R Figure 007

valve the pilot valve is designed as a pressure reducing valve. The servo pressure acting slide on the distributor slide valve actuating cylinder depends on the actuating cylinder spring calibration.

The system opens gradually by a relatively long piston stroke.

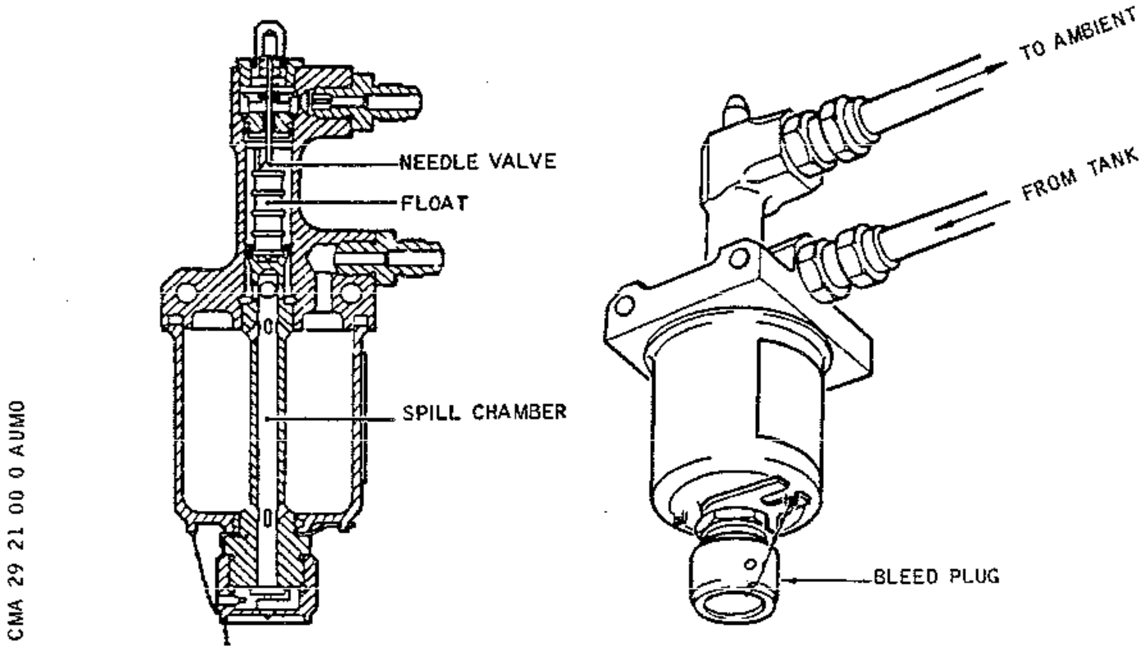
This design avoids any distributor slide valve vibration, and consequent uneven operation of the pressure relief valve.

8. Valve - Tank De-Aerator Safety
R (Ref. Fig. 008.)

A. Description

The de-aerator safety valve connects the tank de-aeration outlet port to ambient, thus enabling continuous de-aeration of the hydraulic fluid.

The valve consists of a housing with a bore at the top, in which a float valve rises and falls.



R Tank De-Aerator Safety Valve
Figure 008

B. Operation

In the event of failure of the tank de-aerator hydraulic fluid fills the body of the safety valve and lifts the float. The needle valve on the end of the float closes the port.

Beneath the float, a spill chamber prevents the valve being closed by any globules of liquid.

9. Operation
R ON A/C 001-006 (Ref. Fig. 009)
R ON A/C 007-007 (Ref. Fig. 009A)

A. The components composing the Yellow system have the following functions:

(1) The hydraulic tank supplies fluid through heat exchangers and shut-off valves, to two self-regulating hydraulic pumps. These supply the various services with hydraulic fluid at 4000 psi (275 bars) pressure, via micronic filters and non-return valves.

(2) A free-moving piston-type hydraulic accumulator installed at the manifold absorbs pressure surges and provides the extra pressure required to compensate for pump response time, when a substantial, instantaneous power supply is required for the services or servo-control units.

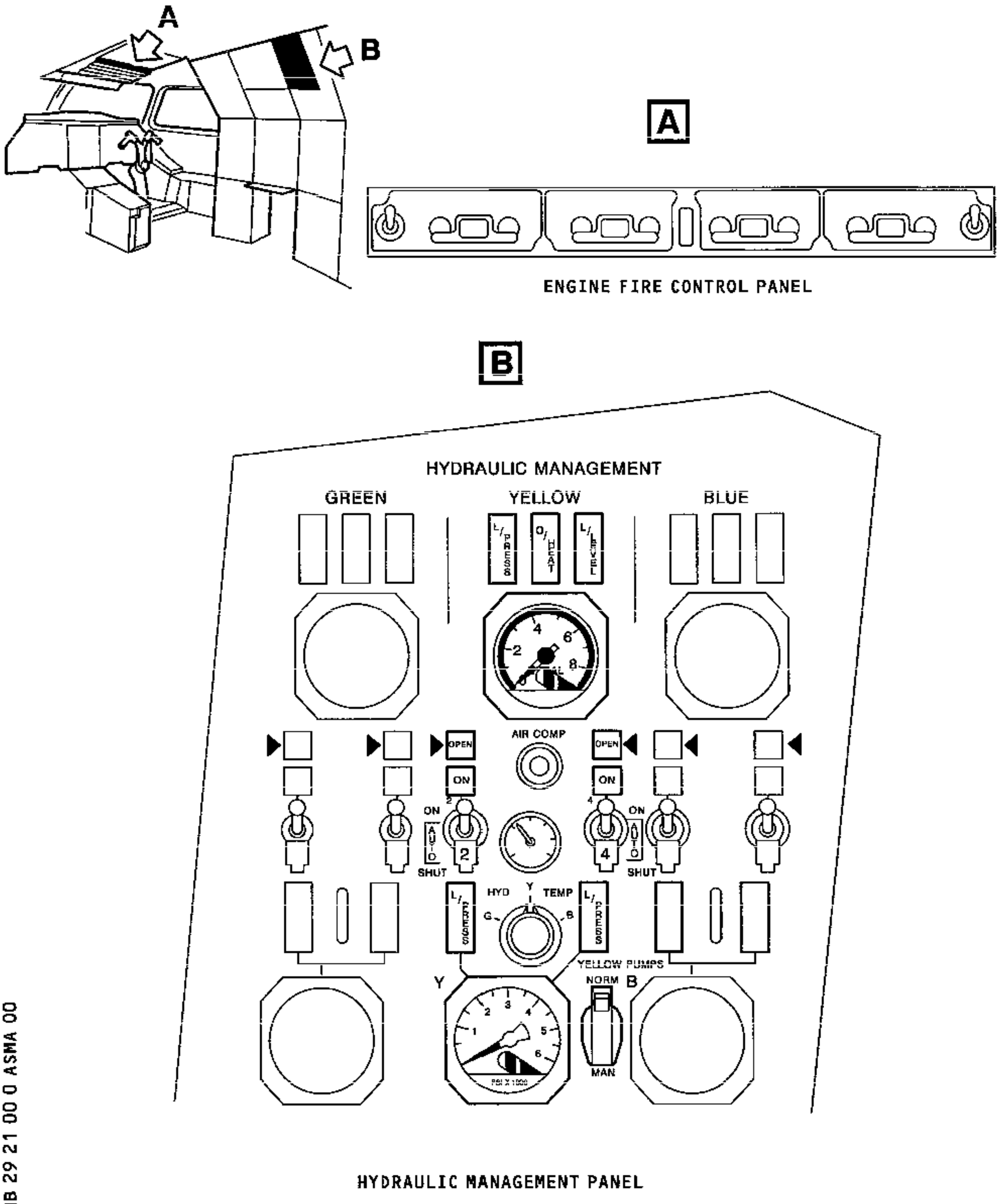
After SB 29-050 For A/C 001-007,

(3) The hydraulic tank is pressurized to 65 psi (4.5 bars) in order to avoid pump cavitation. Its maximum volume is 9 US Gal (7.5 Imp. Gal, 34 litres) and its normal fill quantity is 6.6 US Gal (5.5 Imp Gal, 25 litres).

Any drop in pressurizing air pressure, any fluid overheat or low level conditions are indicated on the 3CM's HYDRAULIC MANAGEMENT panel by three warning lights.

(4) The hydraulic fluid/fuel heat exchangers incorporated in the suction line enable fluid temperature in the system to be kept at an acceptable level of 221 to 229°F (105 to 115°C). The exchangers operate when fluid temperature exceeds 140°F (60°C) or when pump output is less than 9.25 US Gal/min (7.7 Imp Gal/min, 35l/min).

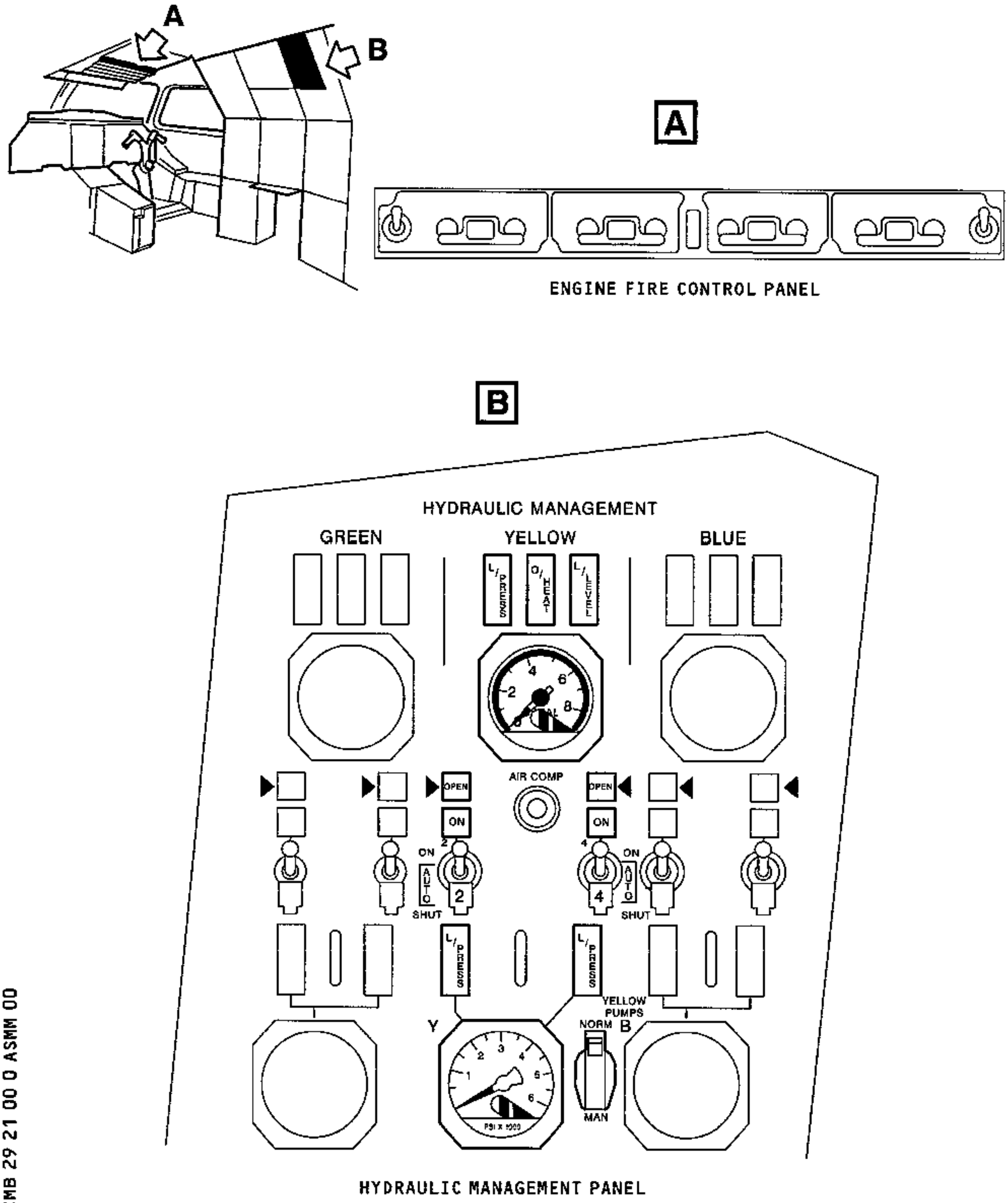
PRINTED IN ENGLAND



Location of Hydraulic and Engine
Fire Control Panels
Figure 009

PRINTED IN ENGLAND

CMB 29 21 00 0 ASMA 00



CMB 29 21 00 0 ASMM 00

Location of Hydraulic and Engine Fire Control Panels
Figure 009A

PRINTED IN ENGLAND

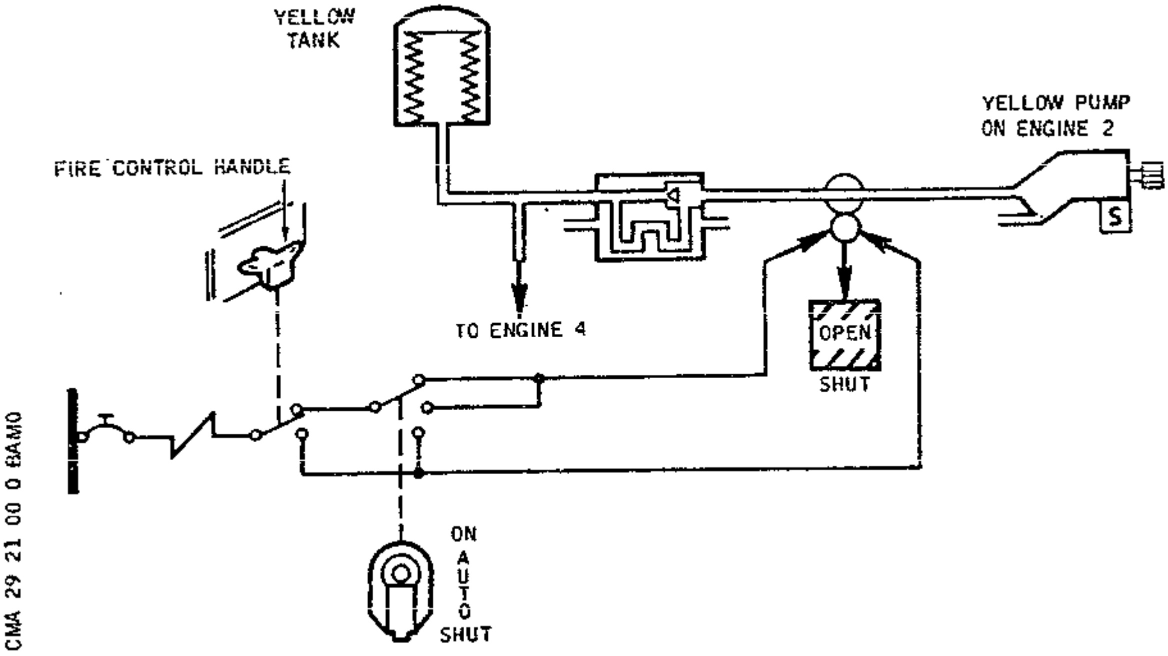
(5) In the event of an engine fire, shut-off valves on the suction line, located in the wing outside the nacelle, cut off the hydraulic fluid supply. Each valve is operated by an electric motor controlled by a 3-position ON, AUTO, SHUT switch on the 3CM's panel:

ON, AUTO position : shut-off valve open
SHUT position : shut-off valve closed

The SHUT position can only be obtained after the sealed guard on the switch has been raised.

In the event of an engine fire, actuation of the relevant ENG FIRE handle causes the shut-off valves to close. A magnetic indicator on the 3CM's panel shows the position of the shut-off valve (OPEN or SHUT). During valve transit the de-energized indicator is cross-hatched.
(Ref. Fig. 010)

PRINTED IN ENGLAND



Shut-Off Valve Control and Indication
Figure 010

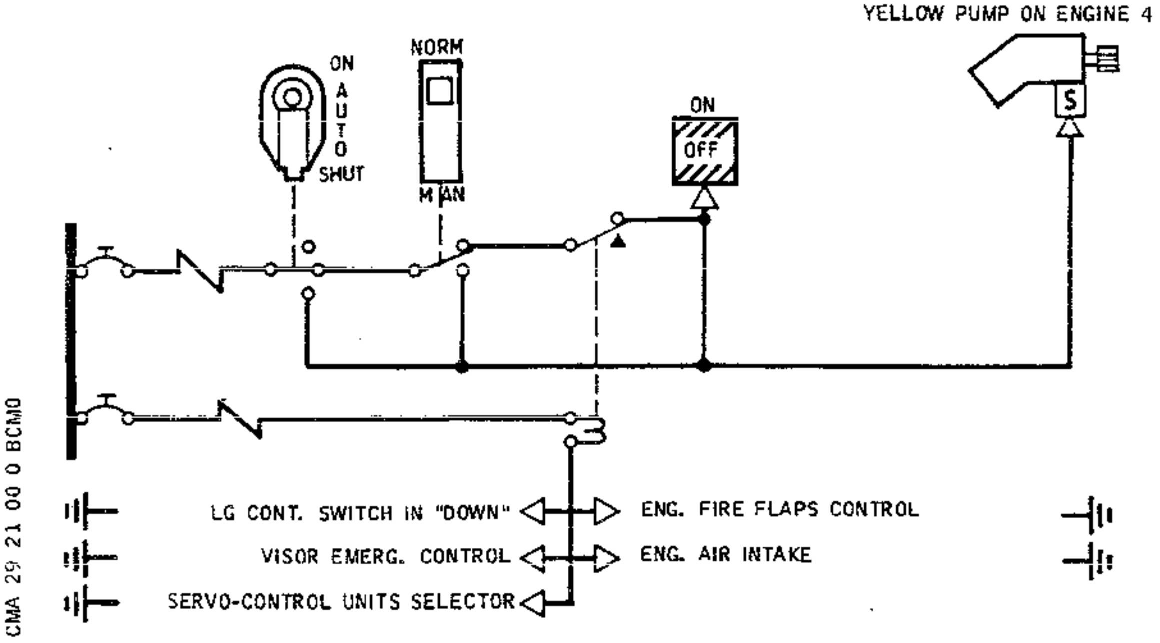
PRINTED IN ENGLAND

INTENTIONALLY BLANK

(6) The two self-regulating pumps driven by engines 2 and 4 accessory gearboxes supply a pressure of 4000 psi (275 bars) and can provide a nominal delivery of 17.18 US Gal/min (65 l/min, 14.52 Imp Gal/min). Circulation of recuperated return leakage ensures cool-ling and lubrification of the pump.

Each pump has a solenoid-controlled depressurizing system. Teh solenoid is energized by the 3-position ON, AUTO, SHUT switch on the Flight Engineer's panel :
R (Ref. Fig. 011)

- In ON position the solenoid is not energized and



Control and Indicating of Yellow System Pumps
R Figure 011

the pump is pressurized.
- In AUTO or SHUT position the solenoid is energized and the pump depressurized.

A magnetic indicator on the Flight Engineer's panel indicates whether the pump is pressurized or depressu-rized (it displays ON or OFF respectively).

Normally in flight, the switch is in the AUTO position and the pump is depressurized by the contacts, which close, of the Yellow pump depressurization relay,

operated by the landing gear normal control switch in the UP position.

If this relay fails to operate, a NORM-MAN switch on the Flight Engineer's panel which is sealed in the NORM position, enables manual depressurization of the pumps.

At take-off and landing, both Yellow system pumps are pressurized automatically when the landing gear normal control switch is in the DOWN position.

They are also automatically pressurized for the following emergency operations :

- Operation of the fire flaps of the four engines
- Operation of the air intakes of the four engines
- Lowering of the droop nose and visor

- Operation of the servo-control units (either Yellow/ Blue or Yellow/Green).

The 3-position switch on the Flight Engineer's HYDRAULIC MANAGEMENT panel confirms or allows control of pump pressurization.

A magnetic indicator on the Flight Engineer's panel displays ON or OFF according to whether the pump is pressurized or depressurized.

(7) The suction, delivery and case drain hoses are composed of two concentric reinforced pipes. The hydraulic fluid normally flows through the inner pipe. In the event of leakage it passes into the outer pipe.

A mechanical check device fitted on the hose connection enebles the condition of the inner pipe to be checked.

On the pump HP delivery hose, any fluid leakage in the inner pipe is drained off into the pump suction line.

After SB 29-045-02 For A/C 001-007,

(7) Not applicable

(8) A pressure switch pre-set to 2030.5 psi (140 bars) is mounted in parallel with the delivery line of each pump to indicate any pump failure.

(9) A non-return valve prevents any back pressure on the pump should the engine or the pump itself shut down. It also maintains the pressure of the other pump in the system.

(10) Delivery pressure signals are transmitted to an indicator on the Flight Engineer's panel by a pressure transmitter mounted in parallel with the servo-control selector supply line.

(11) A pressure relief and manual unloading valve preset to 4583 psi (316 bar) and mounted on the manifold protects the system from excess pressure due to thermal expansion of the fluid, or to a malfunction of the pump regulation system.
The manually actuated unloading device enables the hydraulic system to be depressurized during ground maintenance on trouble shooting work.

PRINTED IN ENGLAND

(12) If power is supplied by the ram air turbine, a priority valve cuts off fluid flow to the landing
R gear in the event of pressure falling below 2610 +72
R -145 psi (180 +5 -10 bar) so that pressure is supplied in priority to the flight controls.

(13) All services and pump case drain returns to the tank pass through non-return valves and a 3-micron absolute LP filter.

(14) A valve fitted on each HP and LP filter allows the filter element to be removed without the tank having to be drained.

(15) The system is self-bleeding and no special bleeding procedure is required when equipment is changed. Pressurization of the system and a component functional test are sufficient to eliminate any air.

(16) The tank is filled on the ground through a ground connector and an LP filter.

(17) Two ground connectors fitted with self-sealing valves enable system pressurizing and testing to be carried out using ground power units.

(18) Self-sealing valves enable rapid disconnection of the hydraulic lines during removal of an engine.

10. Electrical Power Supply

Power is supplied to the control and indicating circuits by the essential busbar.
The busbars, and the panels on which they are located, are listed in the following chart:

SERVICE	BUSBAR		C/B	PANEL
ENG4 SHUT OFF VALVES CONT	No.3 ESSENTIAL	115 VAC	7X	2-213
ENG2 SHUT OFF VALVES CONT	No.1 ESSENTIAL	115 VAC	5X	5-213
HYD PUMP CONTROL	A MAIN	28 VDC	1P	15-215
YELL, L.L O/HEAT IND	A MAIN	28 VDC	1P	15-215
SHUT OFF VALVES IND	B MAIN	28 VDC	2P	15-216
YELL TANK CONTENTS IND	B MAIN	26 VAC	13X	13-216
HYD FLUID TEMP IND	A MAIN	28 VDC	1P	15-215

PRINTED IN ENGLAND

YELLOW SYSTEM - TROUBLE SHOOTING

WARNING : MAKE CERTAIN THAT THE POSITIONS OF NOSE AND MAIN GEAR DOORS CORRESPOND WITH THE ACTUAL POSITIONS OF THE RESPECTIVE OPERATING HANDLES.
HANDLE LOCKED, INDICATOR PLATE SHOWING WHITE : DOORS CLOSED.
HANDLE LOCKED, INDICATOR PLATE SHOWING RED : DOORS OPEN.

MAKE CERTAIN THAT THE LANDING GEAR POSITION INDICATED ON THE GEARS POSITION INDICATING UNIT CORRESPONDS WITH THE ACTUAL POSITION OF THE LANDING GEAR.

BEFORE APPLYING OR BELLEVING HYDRAULIC SYSTEM PRESSURE, MAKE CERTAIN THAT THE TRAVEL RANGES OF THE CONTROL SURFACES ARE CLEAR.

BEFORE PRESSURIZING HYDRAULIC SYSTEMS, CHECK THAT ALL CONTROLS ARE SET TO CORRESPOND WITH THE ACTUAL POSITION OF THE SERVICES THEY OPERATE.

MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

OBSERVE THE ELECTRICAL SAFETY PRECAUTIONS DESCRIBED IN CHAPTER 24-00-00, SERVICING.

1. General

In order to obtain rapid trouble shooting of hydraulic system, fault analysis is divided in two parts :

- Trouble shooting with the engines shut down
- Trouble shooting with the engines operating

Procedure described below deals only with pump 1 system; for pump 2 system transpose indications in parentheses.
The defect can be isolated with the aid of the trouble shooting procedures and traced through OK and NOT OK paths to the appropriate charts or other specified rectification action as may be necessary. If a defect occurs perform the appropriate rectification action, then repeat the operation at which the defect was encountered to ensure the operation is OK.
Bracketed numbers in the procedures and charts indicate items on the component identification table (Ref. Table 101).
The table provides information, including component location, required for rectification. All procedures dealing with trouble shooting are based on the assumption that electrical wiring is serviceable, all associated circuit breakers are set and electrical power is available, unless otherwise stated. If the fault

is not rectified check the wiring in accordance with the Wiring Diagram Manual (Ref. Table 101).

2. Prepare

A. Equipment and Materials

DESCRIPTION	PART NO.
Electrical Ground Power Unit	

B. Check that the following circuit breakers are set :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
ENG 1 SHUT-OFF-VALVES CONT	2-213	W 3	F15
GRN SYS PRESS IND	2-213	1D 21	C15
BLUE SYS PRESS IND	2-213	3D 21	D15
ENG 2 SHUT-OFF-VALVES CONT	2-213	W 7	B15
ENG 4 SHUT-OFF-VALVES CONT	4-213	W 8	C10
ENG 3 SHUT-OFF-VALVES CONT	4-213	W 4	D10
YELL SYS PRESS IND	4-213	2D 21	E10
GRN TANK CONTENTS IND	13-215	D 41	E 8
BLUE TANK CONTENTS IND	13-215	D 43	F 8
HYD TANK AIR AOMP SUP	13-215	M 601	G 7
YELL TANK CONTENTS IND	13-216	D 42	B12
HYD GRND CHECK OUT PUMP CONT	14-216	M 626	A16
ENG 2 YELL PUMP CONT IND	15-215	M 311	B 8
ENG 4 YELL PUMP CONT IND	15-215	M 312	B 9
YELL LL. LP O/HEAT IND	15-215	G 261	C 9
ENG 1 GRN PUMP CONT IND	15-215	M 271	D 6
ENG 2 GRN PUMP CONT IND	15-215	M 272	D 7
HYD TANKS COMPR CONT	15-215	M 602	D 8
YELL PUMPS AUTO ON LOAD CONT	15-215	M 341	E 6
ENG 3 BLUE PUMP CONT IND	15-215	M 342	E 7
ENG 4 BLUE PUMP CONT IND	15-215	M 343	E 8
ENG 1 and 2 SHUT_OFF-VALVES IND	15-216	W 5	C18
ENG 3 and 4 SHUT-OFF-	15-216	W 6	C19

Printed in England

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
VALVES IND			
BLUE LL. LP O/HEAT IND	15-216	G 262	D19
GRN LL. LP O/HEAT IND	15-216	G 263	D20
HYD GRND CHECK OUT SEL	15-216	M 626	F22

C. On Flight Engineer's HYDRAULIC MANAGEMENT panel check that ON OFF SHUT control switches are in the following positions:

Switch : ON OFF SHUT - GREEN in ON position.
Switch : ON OFF SHUT - BLUE in ON position.
Switch : ON OFF SHUT - YELLOW in AUTO position.

D. Place landing gear Normal control lever in DOWN position and set the following circuit breaker :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
YELLOW PUMPS AUTO ON LOAD CONT	15-215	M 341	E 6

E. Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing).

F. On master warning panel cancel out HYD warning light (press then release warning light).

G. On HYDRAULIC MANAGEMENT panel place ON-OFF-SHUT 2 (4) YELLOW switch in ON position.

H. On master warning panel check that;

```
*************************************
*HYD warning light is illuminated. If*
*************************************
       ||             |             -------------------------------
       OK             NOT OK--------|Ref29-21-00 Trouble shooting|
       ||                           -------------------------------
       ||
       ||
```

I. On Flight Engineer's HYDRAULIC MANAGEMENT panel, check that:

```
*************************************
*Tank L/PRESS caption lights are off.*
*If,                                 *
*************************************
       ||             |             -------------------------------
       OK             NOT OK--------|Ref29-31-00 Trouble shooting|
       ||                           -------------------------------
*************************************
*O/HEAT caption lights are off. If,  *
*************************************
       ||             |             -------------------------------
       OK             NOT OK--------|Ref29-33-00 Trouble shooting|
       ||                           -------------------------------
*************************************
*L/LEVEL caption lights are off. If  *
*************************************
       ||             |             -------------------------------
       OK             NOT OK--------|Ref29-32-00 Trouble shooting|
       ||                           -------------------------------
       ||
*************************************
*Transmitters indicate a normal      *
*level. If                           *
*************************************
       ||             |
       ||             |             -------------------------------
       ||             NOT OK--------|Ref29-32-00 Trouble shooting|
       ||                           -------------------------------
       ||
       ||
       ||
       OK
       ||
```

```
*************************************
* SHUT OFF VALVES magnetic indicators*
* display OPEN. If,                 *
*************************************
        ||             |
        OK             NOT OK------------
        ||                               |
*************************************    |
* The three hydraulic system PUMPS  *    |
* magnetic indicators display ON. If,*   |
*************************************    |
        ||             |                 |
        OK             NOT OK-----------|
        ||                               |
*************************************    |
* Pump L/PRESS caption lights are   *    |
* illuminated. If,                  *    |
*************************************    |
        ||             |                 |
        OK             NOT OK-----------|
        ||                               |
*************************************    |
* On pressure indicators, warning   *    |
* flags are not visible. If,        *    |
*************************************    |
                       |                 |  ------------------------
                       |                 | | Ref 29-11-00           |
                       |                 | |     29-12-00           |
                       NOT OK-----------|  |     29-21-00           |
                                           |    Trouble shooting    |
                                            ========================
```

3. TROUBLE SHOOTING (Engines shut down)

```
**************************************************
* On master warning panel, HYD warning light is    *
* illuminated and on HYDRAULIC MANAGEMENT panel    *
* L/PRESS 2 (4) caption light is illuminated.      *
**************************************************
     ||       |     ----------------------------------------------
     ||       |     | L/PRESS 2 (4) caption light is off and HYD  |
     ||   NOT OK--| warning light is off.                       |
     ||       |     | Ref chart 101                               |
     ||       |     ----------------------------------------------
     ||       |     ----------------------------------------------
     OK       |     | L/PRESS 2 (4) caption light is illuminated and |
     ||   NOT OK--| HYD warning light is off. Replace relay M 316 |
     ||       |     | [30] M 317 [31]                             |
     ||       |     ----------------------------------------------
     ||       |     ----------------------------------------------
     ||       |     | L/PRESS 2 (4) caption light is off and HYD  |
     ||   NOT OK--| warning light is illuminated                |
     ||       |     | Ref chart 102                               |
     ||             ----------------------------------------------
**************************************************
* On HYDRAULIC MANAGEMENT panel, SHUT OFF VALVE 2  *
* (4) YELLOW magnetic indicator displays OPEN. If  *
**************************************************
     ||       |     ----------------------------------------------
     ||       |     | SHUT OFF VALVES 1 and 2 GREEN and 2 YELLOW  |
     ||   NOT OK--| magnetic indicators are cross hatched Check |
     ||       |     | circuit breaker W5 [16]                     |
     ||       |     ----------------------------------------------
     ||       |     ----------------------------------------------
     ||       |     | SHUT OFF VALVES 3 and 4 BLUE and 4 YELLOW   |
     OK   NOT OK--| magnetic indicators are cross hatched. Check |
     ||       |     | circuit breaker [17]                        |
     ||       |     ----------------------------------------------
     ||       |     ----------------------------------------------
     ||       |     | SHUT OFF VALVE 2 (4) YELLOW magnetic indicator |
     ||   NOT OK--| is cross hatched.                           |
     ||             | Ref chart 103                               |
     ||             ----------------------------------------------
     ||
     ||
```

```
****************************************************
* On HYDRAULIC MANAGEMENT panel PUMPS 2 (4) YELLOW  *
* magnetic indicator displays ON. If,               *
****************************************************
    ||      |      --------------------------------------------------
    ||      |     | PUMPS 2 (4) YELLOW magnetic indicator displays |
    OK   NOT OK--| OFF                                              |
    ||            | Ref chart 104                                    |
    ||             --------------------------------------------------
****************************************************
* On HYDRAULIC MANAGEMENT panel, warning flag is not*
* visible on pressure indicator. If,                *
****************************************************
    ||      |      --------------------------------------------------
    ||      |     | warning flag is visible on pressure indicator.  |
    OK   NOT OK--| Ref chart 105                                    |
    ||             --------------------------------------------------
****************************************************
* On HYDRAULIC MANAGEMENT panel, press L/PRESS 2 (4)*
* YELLOW caption light. PUMPS 2 (4) YELLOW magnetic *
* indicator changes to OFF. If,                     *
****************************************************
    ||      |      --------------------------------------------------
    ||      |     | PUMPS 2 (4) magnetic indicator still displays   |
    OK   NOT OK--| ON. Ref chart 106                                |
    ||             --------------------------------------------------
****************************************************
* On HYDRAULIC MANAGEMENT panel, place switch 2 (4) *
* in AUTO position. PUMPS 2 (4) magnetic indicator  *
* changes TO OFF and L/PRESS 2 (4) caption light    *
* must go OFF. If,                                  *
****************************************************
    ||      |      --------------------------------------------------
    ||      |     | PUMPS 2 (4) magnetic indicator still displays   |
    ||   NOT KO--| ON anf L/PRESS 2 (4) caption light remains       |
    ||      |     | illuminated. Replace switch M 313 [5] M 314 [6]|
    ||      |      --------------------------------------------------
    OK      |      --------------------------------------------------
    ||      |     | PUMPS 2 (4) magnetic indicator still displays   |
    ||      |     | ON, L/PRESS 2 (4) caption light is off. Replace|
    ||   NOT OK--| magnetic indicator M 322 [3] (m 323 [4])         |
    ||             --------------------------------------------------
    ||
    ||
    ||
    ||
```

```
*****************************************************
* On HYDRAULIC MANAGEMENT panel place YELLOW switch *
* 2 (4) in SHUT position.                           *
* SHUT OFF VALVE 2 (4) magnetic indicator is cross  *
* hatched and then displays SHUT, If,               *
*****************************************************
    ||        |     ------------------------------------------------------
    ||        |    | SHUT OFF VALVE 2 (4) magnetic indicator is          |
    ||   NOT OK--| still cross hatched                                   |
    ||        |    | Ref chart 107                                        |
    ||        |     ------------------------------------------------------
    OK        |     ------------------------------------------------------
    ||        |    | SHUT OFF VALVE 2 (4) magnetic indicator still       |
    ||   NOT OK--| displays OPEN                                         |
    ||             | Ref chart 108                                        |
    ||              ------------------------------------------------------
*****************************************************
* On HYDRAULIC MANAGEMENT panel place YELLOW switch *
* 2 (4) in AUTO position.                           *
* SHUT OFF VALVE magnetic indicator is cross hatched*
* and then displays OPEN.                           *
*****************************************************
    ||        |     ------------------------------------------------------
    ||        |    | SHUT OFF VALVE 2 (4) magnetic, indicator is         |
    ||   NOT OK--| still cross hatched                                   |
    ||        |    | Ref chart 109                                        |
    ||        |     ------------------------------------------------------
    OK        |     ------------------------------------------------------
    ||        |    | SHUT OFF VALVE 2 (4) magnetic indicator still       |
    ||   NOT OK--| displays SHUT                                         |
    ||             | Ref chart 110                                        |
    ||              ------------------------------------------------------
    ||
    ||
```

```
***************************************************
* On panel 15-215 set circuit breaker M 341,position*
* E6. On HYDRAULIC MANAGEMENT panel L/PRESS 2 and 4 *
* YELLOW caption lights come on and PUMPS 2 and 4   *
* magnetic indicators display ON.                    *
***************************************************
    ||      |    ------------------------------------------------
    ||      |   | L/PRESS 2 and 4 YELLOW caption lights remain  |
    OK    NOT OK--| OFF and PUMPS 2 and 4 magnetic indicators still|
    ||          | display OFF                                    |
    ||          | Replace relay M 350 [22]                       |
    ||           ------------------------------------------------
***************************************************
* On HYDRAULIC MANAGEMENT panel place YELLOW PUMPS  *
* switch (lift guard) in MAN position.               *
* L/PRESS 2 and 4 caption lights go off and PUMPS 2 *
* and 4 magnetic indicators display OFF.             *
***************************************************
    ||      |    ------------------------------------------------
    ||      |   | L/PRESS 2 and 4 YELLOW caption lights remain  |
    OK    NOT OK--| illuminated amd PUMPS 2 and 4 magnetic       |
    ||          | indicators still display ON                    |
    ||          | Replace YELLOW PUMPS switch M 329 [7]          |
    ||           ------------------------------------------------
***************************************************
* On HYDRAULIC MANAGEMENT panel place, YELLOW PUMPS *
* switch in NORM position (lower guard)              *
* L/PRESS 2 and 4 caption lights come on and PUMPS 2*
* and 4 magnetic indicators display ON.              *
***************************************************
    ||      |    ------------------------------------------------
    ||      |   | L/PRESS 2 and 4 YELLOW caption lights remain  |
    OK    NOT OK--| off and PUMPS 2 and 4 magnetic indicators still|
    ||          | display OFF.                                   |
    ||          | Replace YELLOW PUMP switch M 329 [7]           |
    ||           ------------------------------------------------
    ||
    ||
    ||
```

```
*****************************************************
* On ENGINE FIRE CONTROLS overhead panel, pull      *
* engine 2 (4) shut down handle                     *
* On HYDRAULIC MANAGEMENT panel SHUT OFF VALVES 2   *
* (4) magnetic indicators display OFF. If,          *
*****************************************************
    ||      |      -----------------------------------------------
    ||      |     | SHUT OFF VALVES 2 (4) magnetic indicators still|
    ||      |     | display OPEN.                                  |
    OK    NOT OK--| Replace engine shut down handle 2 W 160 [18]   |
    ||            | (4 W 160 [19])                                 |
    ||             -----------------------------------------------
*****************************************************
* On overhead panel push engine 2(4)shut down handle*
* On HYDRAULIC MANAGEMENT panel, SHUT OFF VALVES 2  *
* (4) magnetic indicator displays OPEN. If,         *
*****************************************************
    ||      |      -----------------------------------------------
    ||      |     | SHUT OFF VALVES 2 (4) magnetic indicator still |
    ||      |     | displays OFF.                                  |
    OK    NOT OK--| Replace engine shut down handle 2 W 160 [18]   |
    ||            | (4 W 160 [19])                                 |
    ||             -----------------------------------------------
*****************************************************
* Pressurize hydraulic system through ground pressu-*
* rizing system (Ref 29-21-00, Servicing). On       *
* HYDRAULIC MANAGEMENT panel system pressure reading*
* is normal.                                        *
*****************************************************
    ||      |      -----------------------------------------------
    OK    NOT OK--| System pressure is not correct.                |
    ||            | Ref chart 111                                  |
    ||             -----------------------------------------------
    ||
    ||
```

4. TROUBLE SHOOTING (Engines operating)

```
*****************************************************
* On HYDRAULIC MANAGEMENT panel, pumps 2 and 4      *
* L/PRESS CAPTION lights are off. If,               *
*****************************************************
    ||     |      -----------------------------------------------
    ||     |     | L/PRESS 2 (4) caption light is illuminated    |
    OK    NOT OK--| Ref chart 112                                |
    ||            -----------------------------------------------
*****************************************************
* On HYDRAULIC MANAGEMENT panel system pressure     *
* reading is normal. If,                            *
*****************************************************
    ||     |      -----------------------------------------------
    ||     |     | System pressure is abnormally high            |
    OK    NOT OK--| Ref chart 113                                |
    ||            -----------------------------------------------
*****************************************************
* On HYDRAULIC MANAGEMENT panel press L/PRESS 2     *
* caption light. PUMPS 2 magnetic indicator displays*
* OFF. After 10 seconds approximately L/PRESS 2     *
* caption light comes on and HYD warning light comes*
* on (master warning panel)                         *
*****************************************************
    ||     |      -----------------------------------------------
    ||     |     | L/PRESS 2 caption light and HYD warning light |
    OK    NOT OK--| do not come on. When engines stop L/PRESS2 cap-|
    ||           | tion light comes on. Replace engine 2 pump [27]|
    ||            -----------------------------------------------
*****************************************************
* On HYDRAULIC MANAGEMENT panel press L/PRESS 4     *
* caption light. PUMPS 4 magnetic indicator displays*
* OFF. After 10 seconds approximately L/PRESS 4     *
* caption light and HYD warning light come on       *
* (Master warning panel)                            *
*****************************************************
    ||     |      -----------------------------------------------
    ||     |     | L/PRESS 4 caption light and HYD warning light |
    ||     |     | do not come on. When engines stop L/PRESS 4   |
    OK    NOT OK--| caption light comes on. Replace engine 4 pump |
    ||           | [28]                                          |
    ||            -----------------------------------------------
*****************************************************
* YELLOW system is operational                      *
*****************************************************
```

```
*************************************-------------------------------
* L/PRESS 2 (4) CAPTION LIGHT IS OFF.*| GROUND EQUIPMENT REQUIRED  |
* HYD WARNING LIGHT IS OFF.          *|----------------------------|
*************************************| DESCRIPTION       PART NO  |
                                     |----------------------------|
                                     | MULTIMETER                 |
                                     ------------------------------

*************************************
* On HYDRAULIC MANAGEMENT panel press*
* L/PRESS 2 (4) YELLOW caption light.*
* PUMPS 2 (4) YELLOW magnetic indica-*
* tor changes to OFF.                *
*************************************
        |                 |          ------------------------------
      NOT OK             OK---------| Replace pressure switch M   |
                                     | 315 [25] (M 315 [26])       |
                                     ------------------------------

*************************************
* On panel 15-215, check circuit     *
* breaker M 311 (M 312) Map ref B 8  *
* (B9)                               *
*************************************
        |                 |          ------------------------------
        OK               NOT OK-----| Remove circuit breaker M    |
        |                            | 311 [14] (M 312 [15])       |
        |                            ------------------------------
*************************************
* In RH HYD RLY BOX zone 3-123 on    *
* connector UT 1838-9 check voltage  *
* between terminal A and ground.     *
*************************************
                 |
                 |
                 0V
                 |
-------------------------------------
| Remove switch M 313 [5] (M 314 [6])|
-------------------------------------
```

Chart 101

```
*************************************
* L/PRESS CAPTION LIGHT IS OFF      *
* HYD WARNING LIGHT IS ILLUMINATED. *
*************************************


*************************************
* On HYDRAULIC MANAGEMENT panel press*
* L/PRESS 2 (4) YELLOW caption light.*
* PUMPS 2 (4) YELLOW magnetic indica-*
* tor changes to OFF.               *
*************************************
        |                   |        ------------------------------
        |                   |       | Replace L/PRESS caption     |
       NOT OK               OK------| light M 324 [8] (325 [9])   |
        |                           | (Ref 8 (9) table 101)       |
        |                            ------------------------------
-------------------------------------
| Replace diode M 318 [32](M 320[33])|
-------------------------------------
```

Chart 102

```
**************************************
* SHUT OFF VALVE 2 (4) YELLOW        *
* MAGNETIC INDICATOR IS CROSS HATCHED*
**************************************


**************************************
* On panel 2-213 trip circuit breaker*
* W7 (W8) position B 15 (G 15) and on*
* panel 15-216 trip circuit breaker  *
* W5 (W6) position c 18 (C 19).      *
* In zone 531 BT (632 CT) disconnect *
* connector of shut off valve W 21   *
* (W 22). Shunt terminals F and D of *
* connector W21 A (W 22 A). Set      *
* circuit breaker W 5 (W 6).         *
* SHUT OFF VALVE 2 (4) magnetic      *
* indicator changes to OPEN          *
**************************************
        |                   |
        |                   |            ------------------------------
        |                   NOT OK----| Replace magnetic indicator |
        |                              | W 13 [1] (W 14 [2])        |
        |                               ------------------------------
        |                               ------------------------------
        |                              | Replace shut off valve W   |
        OK-----------------------------| 21 [23] (W 22 [24]).       |
                                        ------------------------------
```

Chart 103

```
*************************************-------------------------------
* PUMPS 2 (4) YELLOW MAGNETIC       *| GROUND EQUIPMENT REQUIRED   |
* INDICATOR DISPLAYS OFF            *|-----------------------------|
*************************************| DESCRIPTION        PART NO  |
                                     |-----------------------------|
                                     | MULTIMETER                  |
                                     -------------------------------

*************************************
* On RH HYD RLY BOX panel 3-123 on  *
* connection UT 1838-2 (UT 1838-9)  *
* check voltage between terminal 15 *
* (9) and ground.                   *
*************************************
       |                  |          -------------------------------
       |                  |         | Replace caption light M 324|
       OV                 28 V------| [8] (M 325 [9])             |
       |                             -------------------------------
*************************************
* On RH HYD RLY BOX panel 3-123, on *
* terminal strip UM 1848 F (UM 1842F)*
* check voltage between terminal 15 *
* (9) and ground.                   *
*************************************
       |                  |
       |                  |
       28 V               OV===================
       |                                      |
-------------------------------- ---------------------------------
| Replace relay M 328 [20](M 327| | Replace magnetic indicator M   |
| [21])                        | | 322 [3] (M 323 [4])            |
-------------------------------- ---------------------------------
```

Chart 104

```
*************************************
* WARNING FLAG IS VISIBLE ON PRESSURE*
* INDICATOR.                        *
*************************************


*************************************
* On panel 4-213 check circuit      *
* breaker 2 D 21 Position E 10      *
*************************************
        |             |
        |             |         -----------------------------
        |             |         | Replace circuit breaker 2 |
        |        NOT OK---------| D 21 [13]                 |
        |                       -----------------------------
        |                       -----------------------------
        |                       | Replace pressure indicator |
       OK-----------------------| 2 D 22 [10]               |
                                -----------------------------
```

Chart 105

```
*************************************------------------------------
* PUMPS 2 (4) YELLOW MAGNETIC       *| GROUND EQUIPMENT REQUIRED  |
* INDICATOR STILL DISPLAYS ON       *|----------------------------|
*************************************| DESCRIPTION       PART NO  |
                                     |----------------------------|
                                     | MULTIMETER                 |
                                     ------------------------------

*************************************
* On HYDRAULIC MANAGEMENT panel,press*
* and hold L/PRESS 2 (4) caption    *
* light during test.                *
* On RH HYD RLY BOX panel 3-123, on *
* connector UT 1838-2 (1838-9), check*
* voltage between terminal C and    *
* ground.                           *
*************************************
       |                |           ------------------------------
      28 V             0V---------| Replace caption light M 324|
       |                          | [8] (M 325 [9])            |
       |                          ------------------------------
*************************************
* On RH HYD RLY BOX panel 3-123 on  *
* terminal strip UM 1848 F (UM 1842F)*
* check voltage between terminal 15 *
* (9) and ground. (with L/PRESS 2 (4)*
* caption light held pressed)       *
*************************************
       |                |           ------------------------------
       |                |         | Replace relay M 328 [20]   |
       |               0V---------| (M 327 [21])               |
       |                          ------------------------------
       |                          ------------------------------
       |                          | Replace magnetic indicator |
      28 V------------------------| M 322 [3] (M 323 [4])      |
                                  ------------------------------
```

Chart 106

SHUT OFF VALVE 2 (4) MAGNETIC INDICATOR IS STILL CROSS HATCHED

GROUND EQUIPMENT REQUIRED	
DESCRIPTION	PART NO
MULTIMETER	

On panel 2-213 (4-213), trip circuit breaker W 7 (W4) position B15 (D10)
On panel 15-216. Trip circuit breaker W 5 (W6) position C18 (C19)
In zone 531 BT (632 CT) disconnect connector W 21 (W 22), valve side, check continuity between terminals E and D. If,

- OK → Replace magnetic indicator W 13 [1] (W 14 [2])
- NOT OK → Replace shut off valve W 21 [23 (W 22 [24])

Chart 107

```
**************************************-----------------------------
* SHUT OFF VALVE 2 (4) MAGNETIC      *| GROUND EQUIPMENT REQUIRED  |
* INDICATOR STILL DISPLAYS OPEN      *|----------------------------|
**************************************| DESCRIPTION       PART NO  |
                                      |----------------------------|
                                      | MULTIMETER                 |
**************************************-----------------------------
* In zone 531 BT (632 CT) on drive   *
* motor of shut off valve W 21 (W 22)*
* check position indicator.          *
* Red indication is visible          *
**************************************
       |                 |
       OK                NOT OK----------------|
       |                                       |
-------------------------------------------------------------------
| On panel 2-213 (4-213) trip  || On panel 2-213 (4-213) trip cir-|
| circuit breakers W7 (W8) Posi-|| cuit breaker W 7 (W 8) Position |
| tion B 15 (C 10): On panel   || B 15 (C 10) and on panel 15-216 |
| 15-216 trip circuit breaker  || trip circuit breaker W 5 (W6)   |
| W 5 (W6) Position C18 (C19). || Position C 18 (C 19). In zone   |
| In zone 531 BT (632 CT) dis- || 531 BT (632 CT) disconnect elec-|
| connect electrical connector || trical connector of shut off    |
| of shut off valve W 21 (W 22).|| valve W 21 (W 22). On connector |
| Set circuit breaker W 7 (W 8).|| W 21 A (W 22 A), valve side,    |
| Check voltage between termi- || check continuity between pins E |
| nals C and B of connector    || and D                           |
| W 21 A (W 22 A).             ||                                 |
-------------------------------------------------------------------
       |              |              |                |
      28V             0V           NOT OK             OK
       |              |              |                |
       |              |              |                |
-------------------------------------------------------------------
| Replace shut  || Replace      || Replace shut  || Replace magne-|
| off valve W 21|| switch M 313 || off valve W 21 || tic indicator |
| [23](W22 [24])|| [5](M 314[6])|| [23](W 22 [24])|| W 13 [1] (W 11|
|               ||              ||                || [2])          |
-------------------------------------------------------------------
```

Chart 108

```
*************************************----------------------------------
* SHUT OFF VALVE 2 (4) MAGNETIC     *| GROUND EQUIPMENT REQUIRED       |
* INDICATOR IS STILL CROSS HATCHED  *|---------------------------------|
*************************************| DESCRIPTION          PART NO    |
                                     |---------------------------------|
                                     | MULTIMETER                      |
*************************************----------------------------------
* On panel 2-213 (4-213) trip circuit*
* breaker W 7(W 8) Position B 15    *
* (C 10); on panel 15-216 strip cir- *
* cuit breaker W5 (W6) Position C 18 *
* (C 19).                           *
* In zone 531 BT (632 CT) disconnect *
* electrical connector of shut off  *
* valve W 21 (W 22). Set circuit    *
* breaker W 7 (W 8). Check voltage  *
* between terminals A and B of      *
* connector W 21 A (W 22 A)         *
*************************************
        |                    |
        |                    |         ---------------------------------
        |                    |         | Replace switch M313 [5]       |
       28 V                 0V---------| (M 314) [6]                   |
        |                              ---------------------------------
-------------------------------------
| On connector W 21 A (W 22 A), valve|
| side, check continuity between    |
| terminals F and D.                |
-------------------------------------
        |                    |         ---------------------------------
        |                   OK---------| Replace magnetic indicator    |
        |                              | W 21 [1] (W 14 [2])           |
        |                              ---------------------------------
        |                              ---------------------------------
        |                              | Replace shut off valve        |
       NOT OK--------------------------| W 21 [23] (W 22 [24])         |
                                       ---------------------------------
```

Chart 109

```
*************************************-------------------------------
* SHUT OFF VALVE 2 (4) MAGNETIC     *| GROUND EQUIPMENT REQUIRED    |
* INDICATOR STILL DISPLAYS SHUT     *|------------------------------|
*************************************| DESCRIPTION        PART NO   |
                                     |------------------------------|
                                     | MULTIMETER                   |
*************************************-------------------------------
* On panel 2-213 (4-213) trip circuit*
* breaker W7 (W8) Position B 15     *
* (C 10) and on panel 15-216 trip   *
* circuit breaker W5 (W6) Position  *
* C 18 (C 19)                       *
* In zone 531 BT (632 CT) disconnect *
* electrical connector of shut off  *
* valve W 21 (W 22). Set circuit    *
* breaker W 7 (W 8), check voltage  *
* between terminal A and B of       *
* connector W 21 A (W 22 A)         *
*************************************
        |                 |          -------------------------------
        |                 |          | Replace switch M 315 [5]     |
        |               0V----------| (M 314 [6])                  |
        |                            -------------------------------
        |                            -------------------------------
        |                            | Replace shut off valve W     |
      28 V---------------------------| 21 [23] (W 22 [24])          |
                                     -------------------------------
```

Chart 110

```
************************************
* SYSTEM PRESSURE IS NOT CORRECT     *
************************************


************************************
* On panel 2-213 trip circuit breaker*
* 3 D 21, Position  D 15 and on panel*
* 4-213 trip circuit breaker 2 D 21  *
* Position E 10.                     *
* Interchange the two Blue and Yellow*
* pressure indicators. Set circuit   *
* breakers 2 D 21 and 3 D 21.        *
* Pressurize Yellow hydraulic        *
* system (Ref 29-21-00, Servicing).  *
* Indicated pressure is normal.      *
************************************
        |                   |
        |                   |          ------------------------------
        |                   |          | Replace pressure indicator |
        |                   OK---------| 2 D 22 [10]                |
        |                              ------------------------------
        |                              ------------------------------
        |                              | Replace pressure transnit- |
        NOT OK-------------------------| ter 2 D 23 [29]            |
                                       ------------------------------
```

Chart 111

```
**************************************
* L/PRESS 2 (4) CAPTION LIGHT 15     *
* ILLUMINATED (ENGINES OPERATING)    *
**************************************

**************************************
* On HYDRAULIC MANAGEMENT panel press*
* L/PRESS caption light which is off.*
* Pressure remains correct.          *
**************************************
        |                   |
        |                   |          ------------------------------
        |                   |         | Replace hydraulic pump M     |
        |                NOT OK-----| 326 [27] indicated by        |
        |                             | warning.                     |
        |                              ------------------------------
        |                              ------------------------------
        |                             | Replace pressure switch      |
       OK-----------------------------| M 315 [25] indicated by      |
                                      | warning                      |
                                       ------------------------------
```

Chart 112

```
*************************************
* SYSTEM PRESSURE IS ABNORMALLY HIGH.*
* (ENGINES OPERATING)               *
*************************************


*************************************
* On HYDRAULIC MANAGEMENT panel press*
* L/PRESS 2 caption light. Indicated *
* pressure is correct.              *
*************************************
        |                  |     ------------------------------
        |                  NOT OK----| Replace engine 4 hydraulic |
        |                            | pump [28]                  |
        |                            ------------------------------
        |                            ------------------------------
        |                            | Replace engine 2 hydraulic |
        OK---------------------------| pump [27]                  |
                                     ------------------------------
```

Chart 113

ITEM No. AND DESCRIPTION	ACCESS PANEL	PANEL/ ZONE	EQUIP. IDENT.	POSITION	MANUAL REF. MAINT. TOPIC	WIRING DIAGRAM
[1] SHUT OFF VALVE magnetic indicator		3-214	W13	Flight Engineer's panel	19-00-00 R/I	29-21-01
[2] SHUT OFF VALVE magnetic indicator		3-214	W14	Flight Engineer's panel	29-00-00 R/I	29-21-01
[3] PUMPS 2 magnetic indicator		3-214	M322	Flight Engineer's panel	29-00-00 R/I	29-21-01
[4] PUMPS 4 magnetic indicator		3-214	M323	Flight Engineer's panel	29-00-00 R/I	29-21-01
[5] Control switch		3-214	M313	Flight Engineer's panel	29-00-00 R/I	29-21-01
[6] Control switch		3-214	M314	Flight Engineer's panel	29-00-00 R/I	29-21-00
[7] YELLOW PUMPS depressurization switch		3-214	M329	Flight Engineer's panel	29-00-00 R/I	29-21-01
[8] Pump 2 L/PRESS caption light		3-214	M324	Flight Engineer's panel	29-00-00 R/I	29-21-01
[9] Pump 4 L/PRESS caption light		3-214	M325	Flight Engineer's panel	29-00-00 R/I	29-21-01
[10] Pressure indicator		3-214	2D22	Flight Engineer's panel	29-00-00 R/I	29-31-11
[11] Circuit breaker		2-213	W7	B-15	24-50-00 R/I	29-21-11

ITEM No. AND DESCRIPTION	ACCESS PANEL	PANEL/ ZONE	EQUIP. IDENT.	POSITION	MANUAL REF. MAINT. TOPIC	WIRING DIAGRAM
[12] Circuit breaker		4-213	W8	C-10	24-50-00 R/I	29-21-01
[13] Circuit breaker		2-213	2D21	E-10	24-50-00 R/I	29-31-11
[14] Circuit breaker		15-215	M311	B-8	24-50-00 R/I	29-21-01
[15] Circuit breaker		15-215	M312	B-9	24-50-00 R/I	29-21-01
[16] Circuit breaker		15-215	W5	C-18	24-50-00 R/I	29-21-01
[17] Circuit breaker		15-216	W6	C-19	24-50-00 R/I	29-21-01
[18] Engine Shut Down handle No2		4-211	2W160	Pilot's roof panel	26-22-11 R/I	26-22-01
[19] Engine Shut Down handle No4		4-211	4W160	Pilot's roof panel	26-22-11 R/I	26-22-01
[20] Depressu-rization relay	123 AB	3-123	M328		29-00-00 R/I	29-21-01
[21] Depressu-rization relay	123 AB	3-213	M327		29-00-00 R/I	29-21-01
[22] YEL-PUMPS pressurization relay	123 AB	3-213	M350		29-00-00 R/I	29-21-01
[23] Shut off valve	531 BT	531	W21		29-21-42 R/I	29-21-01
[24] Shut off valve	632 CT	632	W22		29-21-42 R/I	29-21-01
[25] Pump No2 pressure switch	531 AT	531	M315		29-21-72 R/I	29-21-01

ITEM No. AND DESCRIPTION	ACCESS PANEL	PANEL/ ZONE	EQUIP. IDENT.	POSITION	MANUAL REF. MAINT. TOPIC	WIRING DIAGRAM
[26] Pump NO4 pressure switch	632 AT	632	M315		29-21-72 R/I	29-21-01
[27] Depressu-rizing solenoid pump No2	426 AB	426	M326		29-21-71 R/I	29-21-01
[28] Depressu-rizing solenoid pump No4	446 AB	446	M326		29-21-71 R/I	29-21-01
[29] Pressure transmitter	151 DB	152	2D23		29-00-00 R/I	29-31-11
[30] Pump de-pressurization relay eng 2	123 AB	3-123	M316		29-00-00 R/I	29-21-01
[31] Pump de-pressurization relay eng 4	123 AB	3-312	M317		29-00-00 R/I	29-21-01
[32] Diode		3-214	M318			
[33] Diode		3-214	M320			

Component Identification
Table 101

1. General

A. Procedure for bleeding hydraulic pump suction lines.

B. Yellow system pressurization using hydraulic ground power unit.

C. Yellow system pressurization using ground pressurizing system (electric pumps).

D. Yellow system depressurization

B Safety measures to be observed during maintenance.

B Except for tests of flight controls, it is recommended
B that, when the Yellow hydraulic system only is to be
B pressurized, the following circuit breakers be tripped to
B prevent deflection on the elevons in the event of untimely
B operation of the PFCU hydraulic supply selector unit :

	SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
B	YELL L/LEVEL PFC	3-213	C282	A 8
B	PFC IND	1-213	C287	N18
B	YELL L/LEVEL PFC			
B	RELAY JACK	1-213	C288	P18

2. Procedure for Bleeding Hydraulic Pump Suction Lines

A. Equipment and Materials

DESCRIPTION	PART NO.
Transparent Vinyl Hose Adaptable to Shut-Off Valve Elbow Coupling	
Hydraulic Tank Pressurizing Equipment, (Air Bottle, with Pressure Reducing Valve)	
Container: Capacity approx. 5 liters (1.30 US Gal, 1.10 Imp. Gal)	
Corrosion Resistant Steel Lockwire,	

DESCRIPTION	PART NO.
Dia. 0.041 in. (1 mm), Condition A	
Access Platform - 13 ft. 7 in. (4.06 metres)	
Wing Protective Mat	
Hydraulic Fluid (Ref. 20-30-00, No.011)	
Electrical Ground Power Unit	

B. Prepare

(1) Position access platform and wing protective mat.

(2) Open access doors on upper wing surface as follows :

(a) No.2 Engine - access door 531BT

(b) No.4 Engine - access door 632CT.

(3) Open access door 153BB, depressurize Yellow system tank and connect tank pressurizing equipment to ground connector 0191.

(4) Make certain that the following circuit breakers are set :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
ENG 2 SHUT OFF VALVES CONT	2-213	W 7	B15
SHUT OFF VALVES IND.	15-216	W 6	C19

(5) Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing).

(6) On Flight Engineer's HYDRAULIC MANAGEMENT panel, make certain that SHUT OFF VALVES-2-YELLOW magnetic indicator displays OPEN.

(7) De-energize the aircraft electrical network (Ref.

24-41-00, Servicing).

C. Bleed

(1) Unscrew and remove blanking cap on bleed valve located on shut-off valve elbow coupling. Connect plastic hose to bleed valve and place other end in container provided.

(2) Pressurize hydraulic tanks to 1 bar (14.504 psi) (Ref. 29-13-00, Servicing).

(3) Open bleed valve and allow hydraulic fluid to flow into container until it no longer contains any air bubbles.

(4) Close shut-off valve bleed valve, wet torque with Product No.011 to between 35 and 49 lbf.in. (0.40 and 0.55 m.daN), then wirelock.

(5) Remove plastic hose, refit cap on bleed valve and wirelock.

(6) Wipe off all traces of fluid.

(7) Replenish tank as required (Ref. 12-12-29).

D. Close-Up

(1) Disconnect and remove tank pressurizing equipment.

(2) Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(3) Disconnect electrical ground power unit (Ref. 24-41-00 Servicing).

(4) Close access doors.

(5) Remove wing protective mat.

(6) Remove access platform.

3. Yellow System Pressurization Using Hydraulic Ground Power Unit

WARNING : MAKE CERTAIN THAT THE POSITIONS OF NOSE AND MAIN GEAR DOORS CORRESPOND WITH THE ACTUAL POSITIONS OF THE RESPECTIVE OPERATING HANDLES.
HANDLE LOCKED, INDICATOR PLATE SHOWING WHITE : DOORS CLOSED.
HANDLE LOCKED, INDICATOR PLATE SHOWING RED : DOORS OPEN.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE MAKE CERTAIN THAT THE TRAVEL RANGES OF THE CONTROL SURFACES ARE CLEAR.

BEFORE PRESSURIZING HYDRAULIC SYSTEMS, CHECK THAT ALL CONTROLS ARE SET TO CORRESPOND WITH THE ACTUAL POSITION OF THE SERVICES THEY OPERATE.

MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

A. Equipment and Materials

DESCRIPTION	PART NO.
Ground Power Unit - Hydraulic - Power and Preliminary Testing	EMH 398E
Hydraulic Tank Pressurizing Equipment (Air Bottle with Pressure Reducing Valve)	
Access Platforms - 5 ft. 11 in. (1.8 m)	
Electrical Ground Power Unit	

B. Prepare

(1) Take the precautions described in the previous WARNING paragraph.

(2) Position access platforms.

(3) Open access door 151DB under fuselage and depressurize Yellow system by actuating control lever of associated pressure relief and manual unloading valve (3339).

Printed in England

(4) Open engine panel 426AB (Ref. 71-00-00, Servicing).

(5) Open access door 153BB and make certain that fluid level in Yellow tank is normal.

(6) Pressurize hydraulic tanks (Ref. 29-13-00, Servicing).

(7) Connect electrical ground power unit (Ref. 24-41-00, Servicing).

(8) Make certain that the following circuit breakers are set :

SERVICE	PANEL	CIRCUIT BREAKER		MAP REF.
ENG 2 SHUT OFF VALVES CONT	2-213	W	7	B15
SHUT OFF VALVES IND	15-216	W	6	C19

C. Pressurization (Ref. Fig. 301)

(1) Energize the aircraft electrical network (24-41-00, Servicing).

(2) On Flight Engineer'S HYDRAULIC MANAGEMENT panel, make certain that SHUT-OFF VALVES -2- YELLOW magnetic indicator displays OPEN.

(3) In zone 426, remove caps from ground connectors, and connect hydraulic ground power unit lines.

(4) Start up hydraulic ground power unit, and increase system pressure.

(5) Proceed with tests requiring hydraulic pressure.

D. Procedure for Stopping Pressurization

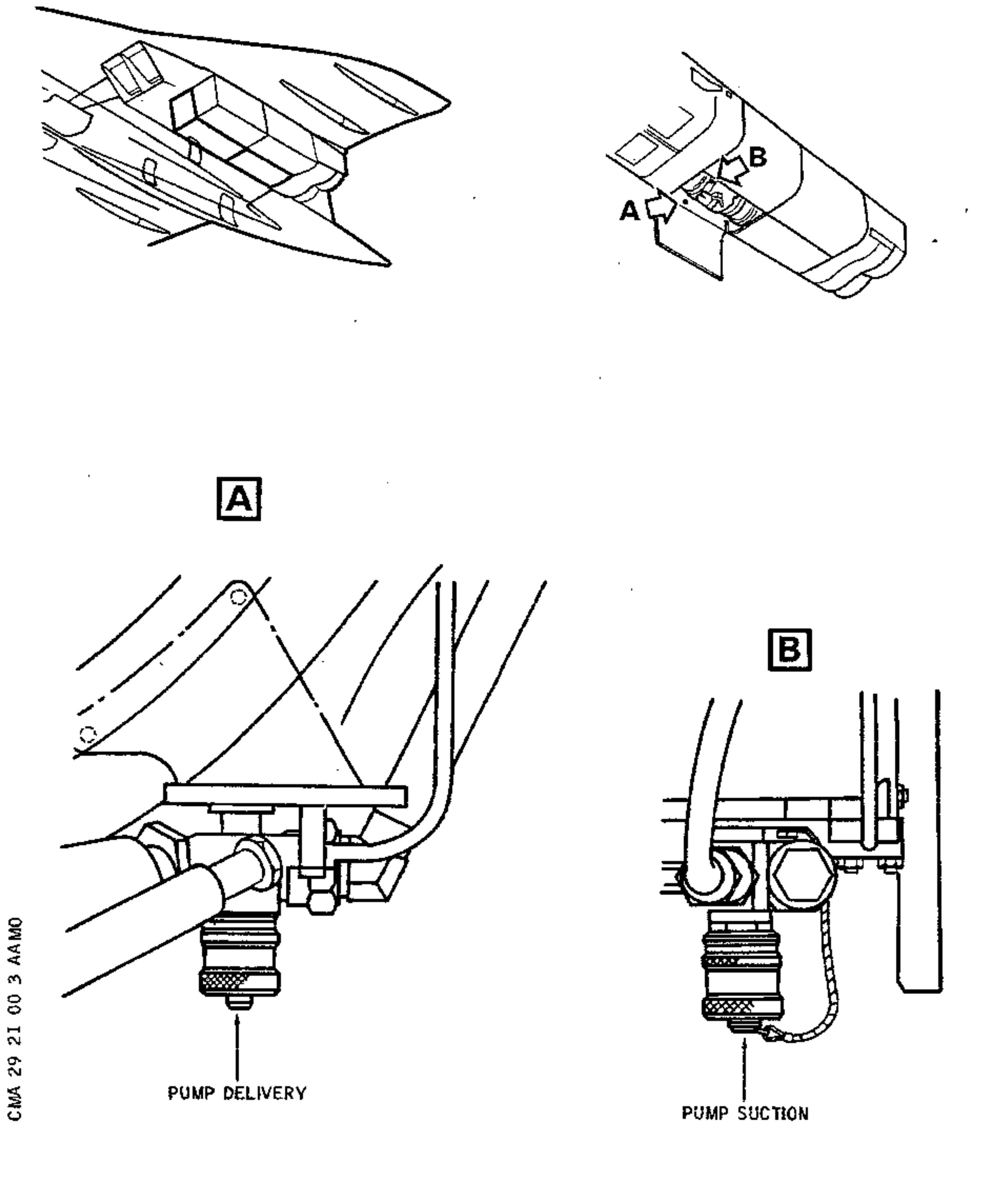
(1) Shut down hydraulic ground power unit.

(2) At zone 151, depressurize Yellow system.

(3) Disconnect hydraulic ground power unit.

(4) Install caps on ground connectors.

E. Close-Up



Location of Yellow System Ground Connectors
Figure 301

(1) Close engine panels 426AB (Ref. 71-00-00, Servicing), and access doors 151DB and 153BB.

(2) De-energize the aircraft electrical network and disconnect electrical ground power unit.

(3) Remove hydraulic ground power unit.

(4) Remove access platforms.

Printed in England

4. Yellow System Pressurization Using Ground Pressurizing System (Electric Pumps)

WARNING : MAKE CERTAIN THAT THE POSITIONS OF NOSE AND MAIN GEAR DOORS CORRESPOND WITH THE ACTUAL POSITIONS OF THE RESPECTIVE OPERATING HANDLES.
HANDLE LOCKED, INDICATOR PLATE SHOWING WHITE : DOORS CLOSED.
HANDLE LOCKED, INDICATOR PLATE SHOWING RED : DOORS OPEN.

MAKE CERTAIN THAT THE LANDING GEAR POSITION INDICATED ON THE GEARS POSITION INDICATING UNIT CORRESPONDS WITH THE ACTUAL POSITION OF THE LANDING GEAR.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE, MAKE CERTAIN THAT THE TRAVEL RANGES OF THE CONTROL SURFACES ARE CLEAR.

BEFORE PRESSURIZING HYDRAULIC SYSTEMS, CHECK THAT ALL CONTROLS ARE SET TO CORRESPOND WITH THE ACTUAL POSITION OF THE SERVICES THEY OPERATE.

MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

A. Equipment and Materials

DESCRIPTION	PART NO.
Electrical Ground Power Unit	
Access Platform - 9 ft. 8 in. (2.96 m)	

B. Prepare

(1) Take the precautions described in the previous WARNING paragraph.

(2) Open access door 153BB under fuselage and make certain that fluid level in Yellow tank is normal.

(3) Make certain that the following circuit breakers are set :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
HYD GRND CHECK OUT PUMP CONT	14-216	M 656	A16
HYD GRND CHECK OUT SEL VALVE CONT	15-216	M 626	F22

(4) Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing).

C. Pressurization

(1) Pressurize hydraulic tanks (Ref. 29-13-00, Servicing).

(2) Pressurize Yellow system as follows :

- On Flight Engineer'S GROUND HYD CHECK OUT panel

(a) Make certain that selector switch is in YELLOW - YELLOW position.

(b) Place PUMP 1 G-Y and PUMP 2 B-Y switches in ON position.

(3) The Yellow system pressure displayed on Flight Engineer's HYDRAULIC MANAGEMENT panel must rise, and stabilize at between 3408 and 3553 psi (235 bars and 245 bars).

(4) Proceed with tests requiring Yellow system hydraulic pressure.

D. Procedure for Stopping Pressurization

(1) On Flight Engineer'S GROUND HYD CHECK OUT panel :

- Place PUMP 1 G-Y and PUMP 2 B-Y switches in OFF position.

E. Close-Up

(1) De-energize the aircraft electrical network and disconnect electrical ground power unit (Ref. 24-41-00, servicing).

(2) Close access doors.

(3) Remove access platform.

5. Yellow System Depressurization

WARNING : BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE, MAKE CERTAIN THAT THE TRAVEL RANGES OF THE CONTROL SURFACES ARE CLEAR.
MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

A. General

The hydraulic systems can be depressurized on the ground by means of the pressure relief and manual unloading valves, located in zone 151, near access door 151DB.

B. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform 2.960 m (9 ft. 8 in.)	

C. Prepare

(1) Open access door 151DB under fuselage.

D. Depressurization (Ref. Fig. 302)

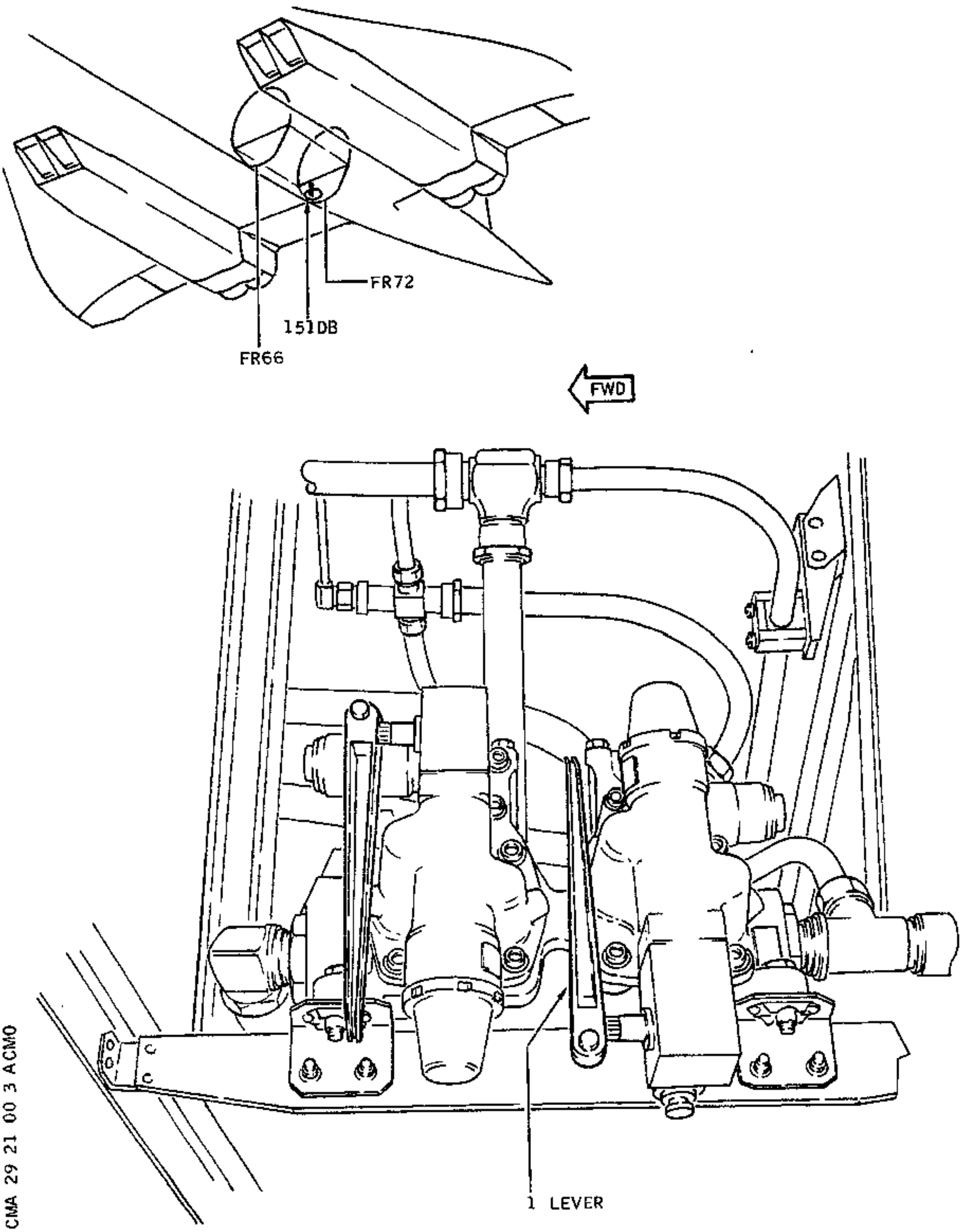
(1) Pull lever (1) on pressure relief and manual unloading valve (3339)

(2) Check on pressure gauge of Yellow system accumulator (3333) that system pressure drops.
Accumulator (3333) is located in the same zone as the pressure relief and manual unloading valve.

(3) When system pressure is nil, return lever (1) to its original position.

E. Close-Up

(1) Close access door and remove access platform.



Pressure Relief and Manual Unloading Valve
Figure 302

YELLOW SYSTEM - ADJUSTMENT/TEST

WARNING : MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

MAKE CERTAIN THAT HYDRAULIC SYSTEMS ARE DEPRESSURIZED.

1. General

The two engine-driven yellow hydraulic system pumps are normally pressurized when the solenoid controlling their depressurization is not energized.

2. Functional Test

Check for correct operation of pump pressurizing and depressurizing system.

A. Equipment and Materials

DESCRIPTION	PART NO.
Electrical Ground Power Unit	
Ground Service Interphone	

B. Prepare

(1) Take the precautions described in the previous WARNING paragraph.

(2) Trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
ENG 2 YELL PUMP CONT IND	15-215	M 311	B 8
ENG 4 YELL PUMP CONT IND		M 312	B 9
YELL PUMPS AUTO ON LOAD CONT		M 341	E 6

(3) Make certain that the following circuit breakers are set :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
ENG 2 SHUT DOWN CONT	1-213	2K 253	D 1
ENG 3 SHUT DOWN CONT		3K 253	D 2
AUDIO WARN SYS SUP 1		W 371	M21
MWS SUP 1		W 252	N21
ENG 1 SHUT DOWN CONT	3-213	1K 253	F 3
ENG 4 SHUT DOWN CONT		4K 253	F 4
AUDIO WARN SYS SUP 2	5-213	W 372	C17
MWS SUP 2		W 251	D15

(4) On First Officer's panel make certain that landing gear normal control switch is in DOWN position.

(5) On overhead panel SERVO CONTROLS unit, make certain that control switches are in NORMAL position.

(6) On Flight Engineer's AIR INTAKES panel place the four AUTO-YELLOW-GREEN and AUTO-YELLOW-BLUE switches in AUTO position. Make certain that the four RAMP SPILL MASTER switches are in AUTO position.

R (7) On centre console, place STANDBY VISOR CONTROL switch in OFF position.

(8) On ENGINE FIRE CONTROLS overhead panel make certain that fire control handles are in normal position (pushed in).

(9) Open access doors 153AB and 153BB and make certain that Yellow hydraulic tank fluid level is normal.

(10) On Flight Engineer's HYDRAULIC MANAGEMENT panel check that YELLOW switches 2 and 4 are in ON position and that YELLOW PUMPS switch is in normal position.

(11) Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing)

- HYD warning light on master warning panel must come on
- The single-stroke gong sounds.

(12) Extinguish HYD warning light (press light, then relase)

C. Test

(1) On panel 15-215, reset circuit breaker M312.
On Flight Engineer's HYDRAULIC MANAGEMENT panel, L/PRESS-4-YELLOW caption light must come on, and PUMPS 4 magnetic indicator must display ON.

On master warning panel, HYD warning light must come on.
Single stroke gong must sound.

NOTE : The warnings are time-delayed by approximately 0.5 seconds.

(2) On Flight Engineer's HYDRAULIC MANAGEMENT panel, press L/PRESS-4-YELLOW caption light :
Caption light remains illuminated

On Flight Engineer's panel, PUMPS-4-YELLOW magnetic indicator must display OFF.
In zone 446 the pump depressurization solenoid (energized) must operate (aural confirmation). The pump is depressurized (de-activated).

(3) On Flight Engineer's HYDRAULIC MANAGEMENT panel, release L/PRESS-4-YELLOW caption light.
Caption light remains illuminated.

On Flight Engineer's panel PUMPS-4-YELLOW magnetic indicator must display ON.
In zone 446, the pump depressurization solenoid is no longer energized. The pump is pressurized (activated).

(4) On Flight Engineer's HYDRAULIC MANAGEMENT panel, place YELLOW switch 4 in AUTO position.
On this panel :
- L/PRESS-4-YELLOW caption light must go off.
- PUMPS-4-YELLOW magnetic indicator must display OFF.

In zone 446, the pump depressurization solenoid (energized) must operate (aural confirmation). The pump is depressurized (de-activated).
Extinguish HYD warning light.

(5) On panel 15-215, reset circuit breaker M311.

On Flight Engineer's HYDRAULIC MANAGEMENT panel, L/PRESS-2-YELLOW caption light must come on ; PUMPS-2 magnetic indicator must display ON.

Printed in England

On master warning panel, HYD warning light must come on.
Single stroke gong must sound.

<u>NOTE</u> : The warnings are time-delayed by approximately 0.5 seconds.

(6) On Flight Engineer's HYDRAULIC MANAGEMENT panel, press L/PRESS-2-YELLOW caption light.
Caption light remains illuminated.

On Flight Engineer's panel PUMPS-2-YELLOW magnetic indicator must display OFF.
In zone 426, the pump depressurization solenoid (energized) must operate (aural confirmation). The pump is depressurized (de-activated).

(7) On Flight Engineer's HYDRAULIC MANAGEMENT panel, release L/PRESS-2-YELLOW caption light.
Caption light remains illuminated.

On Flight Engineer's panel PUMPS-2-YELLOW magnetic indicator must display ON.
In zone 446 pump depressurization solenoid is no longer energized. The pump is pressurized (activated).

(8) On Flight Engineer's HYDRAULIC MANAGEMENT panel, place YELLOW switch 2 in AUTO position.
On this panel :
- L/PRESS-2-YELLOW caption light must go off.
- PUMPS-2-YELLOW magnetic indicator must display OFF.

In zone 426, the pump depressurization solenoid (energized) must operate (aural confirmation). The pump is depressurized (de-activated).
Extinguish HYD warning light.

(9) On panel 15-215, reset circuit breaker M341, with normal landing gear control switch on First Officer's panel in DOWN position.

On Flight Engineer's HYDRAULIC MANAGEMENT panel :
- L/PRESS-2 and 4-YELLOW caption lights must come on.
- PUMPS-2 and 4-YELLOW magnetic indicators must display ON.

On master warning panel, HYD warning light must come on.
Single stroke gong must sound.

In zones 426 and 446, the depressurization solenoids are no longer energized; the pumps are pressurized (activated).

(10) On Flight Engineer's HYDRAULIC MANAGEMENT panel, place YELLOW PUMPS switch in MANUAL position :

R - L/PRESS-2 and 4-YELLOW caption lights must go off.

R - PUMPS-2 and 4-YELLOW magnetic indicators must display OFF.

In zones 426 and 446, depressurization solenoids (energized) must operate (aural confirmation).
The pumps are depressurized (de-activated).
R Extinguish HYD warning light.

(11) On Flight Engineer's HYDRAULIC MANAGEMENT panel, place YELLOW PUMPS switch in NORMAL position.

R - L/PRESS-2 and 4-YELLOW caption lights must come on.

R - PUMPS-2 and 4-YELLOW magnetic indicators must display ON

R On master warning panel, HYD warning light must come on.
R Single stroke gong must sound.

In zones 446 and 426, the depressurization solenoids are no longer energized. The pumps are pressurized (activated).

(12) On First Officer's panel, place normal landing gear control switch in NEUTRAL position :

On Flight Engineer's HYDRAULIC MANAGEMENT panel :

R - L/PRESS-2 and 4-YELLOW caption lights must extinguish.

R - PUMPS-2 and 4-YELLOW magnetic indicators must display OFF.

In zones 426 and 446, the pump depressurization solenoids (energized) must operate (aural confirmation).
The pumps are depressurized (de-activated).
R Extinguish HYD warning light.

(13) On Flight Engineer's HYDRAULIC MANAGEMENT panel, place YELLOW switches 2 and 4 in SHUT position.
On this panel :

R - PUMPS-2 and 4-YELLOW magnetic indicators must display OFF.

R - L/PRESS-2 and 4-YELLOW caption lights must go off.

Printed in England

In zones 426 and 446 the pump depressurization solenoids are energized. The pumps are depressurized (de-activated).

(14) On Flight Engineer's HYDRAULIC MANAGEMENT panel, place YELLOW switches 2 and 4 in AUTO position.
Results identical with para. 13.

(15) On ENGINE FIRE CONTROLS overhead panel, pull out No.1 engine fire control handle.
On Flight Engineer's HYDRAULIC MANAGEMENT panel :
R - L/PRESS-2 and 4-YELLOW caption lights must come on.
R - PUMPS-2 and 4-YELLOW magnetic indicators must display ON.
R
R On master warning panel, HYD warning light must come
R on.
Single stroke gong must sound.

In zones 446 and 426 the depressurization solenoids are no longer energized. The pumps are pressurized (activated).

(16) On ENGINE FIRE CONTROLS overhead panel, push in No.1 engine fire control handle
R - L/PRESS-2 and 4-YELLOW caption lights must go off.
R - PUMPS-2 and 4-YELLOW magnetic indicators display OFF.
R

In zones 446 and 426 the depressurization solenoids (energized) must operate (aural confirmation).
The pumps are depressurized (de-activated).
R Extinguish HYD warning light.

(17) On ENGINE FIRE CONTROLS overhead panel, pull out No.2 engine fire control handle :
- Results identical with para. (15).

(18) Push in No.2 engine fire control handle :
- Results identical with para. (16).

(19) On ENGINE FIRE CONTROLS overhead panel, pull out No.3 engine fire control handle :
- Results identical with para. (15).

(20) Push in No.3 engine fire control handle :
- Results identical with para. (16).

(21) On ENGINE FIRE CONTROLS overhead panel, pull out No.4 engine fire control handle :

- Results identical with para. (15).

(22) Push in No.4 engine fire control handle :
- Results identical with para. (16).

R (23) On centre console, place STANDBY VISOR CONTROL switch
R in VISOR DOWN position :
- Results identical with para. (15).

R (24) Place STANDBY VISOR CONTROL switch in OFF position :
- Results identical with para. (16).

(25) On overhead panel SERVO CONTROLS unit, place lower control switch in YELLOW-GREEN position :
- Results identical with para. (15).

(26) On overhead panel SERVO CONTROLS unit, place control switch in NORMAL position.
- Results identical with para. (16).

(27) On overhead panel SERVO CONTROLS unit, place control switch in YELLOW - BLUE position :
- Results identical with para. (15).

(28) On overhead panel SERVO CONTROLS unit, place control switch in NORMAL position :
- Results identical with para. (16).

(29) On Flight Engineer's AIR INTAKES panel, place No.1 engine AUTO-YELLOW-GREEN switch in YELLOW position :
- Results identical with para. (15).

(30) Place No.1 engine AUTO-YELLOW-GREEN switch in AUTO position :
- Results identical with para. (16).

(31) On Flight Engineer's AIR INTAKES panel, place No.2 engine AUTO-YELLOW-GREEN switch in YELLOW position :
- Results identical with para. (15).

(32) Place No.2 engine AUTO-YELLOW-GREEN switch in AUTO position :
- Results identical with para. (16).

(33) On Flight Engineer's AIR INTAKES panel place No.3 engine AUTO-YELLOW-BLUE switch in YELLOW position :
- Results identical with para. (15).

(34) Place No.3 engine AUTO-YELLOW-BLUE selector switch in AUTO position :
- Results identical with para. (16).

(35) On Flight Engineer's AIR INTAKES panel, place No.4 engine AUTO-YELLOW-BLUE switch in YELLOW position :
- Results identical to para. (15).

(36) Place No.4 engine AUTO-YELLOW-BLUE switch in AUTO position :
- Results identical with para. (16).

D. Close-Up

(1) Place landing gear normal control switch in DOWN position.

R (2) Make certain that STANDBY VISOR CONTROL switch on centre console is in OFF position.

(3) On overhead SERVO CONTROLS unit, make certain that control switches are in NORMAL position.

(4) On overhead panel, safety fire control handles with snap wire.

(5) On Flight Engineer's AIR INTAKES panel make certain that the four selector switches AUTO-YELLOW-GREEN and AUTO-YELLOW-BLUE are in AUTO position.

(6) De-energize the aircraft electrical network and disconnect electrical ground power unit (Ref. 24-41-00, Servicing).

(7) Close access doors.

PRIORITY VALVE - REMOVAL/INSTALLATION

WARNING: MAKE CERTAIN THAT THE POSITIONS OF NOSE AND MAIN GEAR DOORS CORRESPOND WITH THE ACTUAL POSITIONS OF THE RESPECTIVE OPERATING HANDLES.
HANDLE LOCKED, INDICATOR PLATE SHOWING WHITE : DOORS CLOSED.
HANDLE LOCKED, INDICATOR PLATE SHOWING RED : DOORS OPEN.

MAKE CERTAIN THAT THE LANDING GEAR POSITION INDICATED ON THE GEARS POSITION INDICATING UNIT CORRESPONDS WITH THE ACTUAL POSITION OF THE LANDING GEAR.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE, MAKE CERTAIN THAT THE TRAVEL RANGES OF THE CONTROL SURFACES ARE CLEAR.

BEFORE PRESSURIZING HYDRAULIC SYSTEMS, CHECK THAT ALL CONTROLS ARE SET TO CORRESPOND WITH THE ACTUAL POSITION OF THE SERVICES THEY OPERATE.

MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

R

1. General

If power is supplied by the ram air turbine, a priority valve cuts off fluid flow to the landing gear in the event of pressure falling below 2610 +72 -145 psi (180 +5 -10 bar) so that pressure is supplied in priority to the flight controls.

2. Priority Valve

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform, 5 ft. 11 in. (1.8 m)	
Safety Sleeve - Nose Undercarriage Doors	E925002000
Blanking Plugs/Caps	
Warning Notices	
Safety Clips	
Corrosion Resistant Steel Lockwire, Dia 1 mm (0.041 in.).	
Hydraulic Fluid (Ref. 20-30-00, No.11)	

B. Prepare

(1) Take the precautions described in the previous WARNING paragraph.

(2) Open nose landing gear doors (Ref. 32-00-00, Servicing)

(3) Install safety sleeves E925002000 on nose landing gear door jacks.

(4) Open access door 151DB and depressurize Yellow hydraulic system (29-21-00, Servicing).

(5) Open access door 153BB and depressurize Yellow hydraulic system tank (Ref. 29-13-00, Servicing).

(6) Trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
UC RAISE DOORS CLOSE SUP	15-215	G 1	A 6
UC SELECTOR RAISE CONT		G 2	A 7
UC LOWER DOORS OPEN SUP		G 3	A 8
UC SELECTOR LOWER CONT		G 4	A 9
HYD GRND CHECK OUT SEL VALVE CONT	15-216	M 626	F22

WARNING : DISPLAY WARNING NOTICES ON ENGINES 1, 2 AND 3 PROHIBITING PRESSURIZATION OF GREEN, BLUE AND YELLOW HYDRAULIC SYSTEMS BY HYDRAULIC GROUND POWER UNIT.
DISPLAY A WARNING NOTICE AT FLIGHT ENGINEER'S STATION PROHIBITING USE OF GROUND PRESSURIZING SYSTEM ELECTRIC PUMPS.
IF A HYDRAULIC GROUND POWER UNIT IS CONNECTED TO THE AIRCRAFT, DISPLAY A WARNING NOTICE ON UNIT PROHIBITING PRESSURIZATION OF AIRCRAFT HYDRAULIC SYSTEMS.

C. Remove
(Ref. Fig. 401)

(1) Disconnect hydraulic lines (3) from priority valve (1).

(2) Cap/plug all open ports and line ends.

(3) Cut and remove lockwire, remove screws (2) attaching valve to structure.

(4) Remove priority valve.

D. Preparation of Replacement Component

(1) Remove hydraulic fittings from removed valve and mark to identify their respective positions.

(2) Install the fittings on new valve, ensuring that each fitting is in its initial position. Install new packings and back-up rings.

(3) Check that new valve is filled with product No.11.

E. Install

(1) Position valve on mount and attach with screws (2). Wirelock as per 20-21-13.

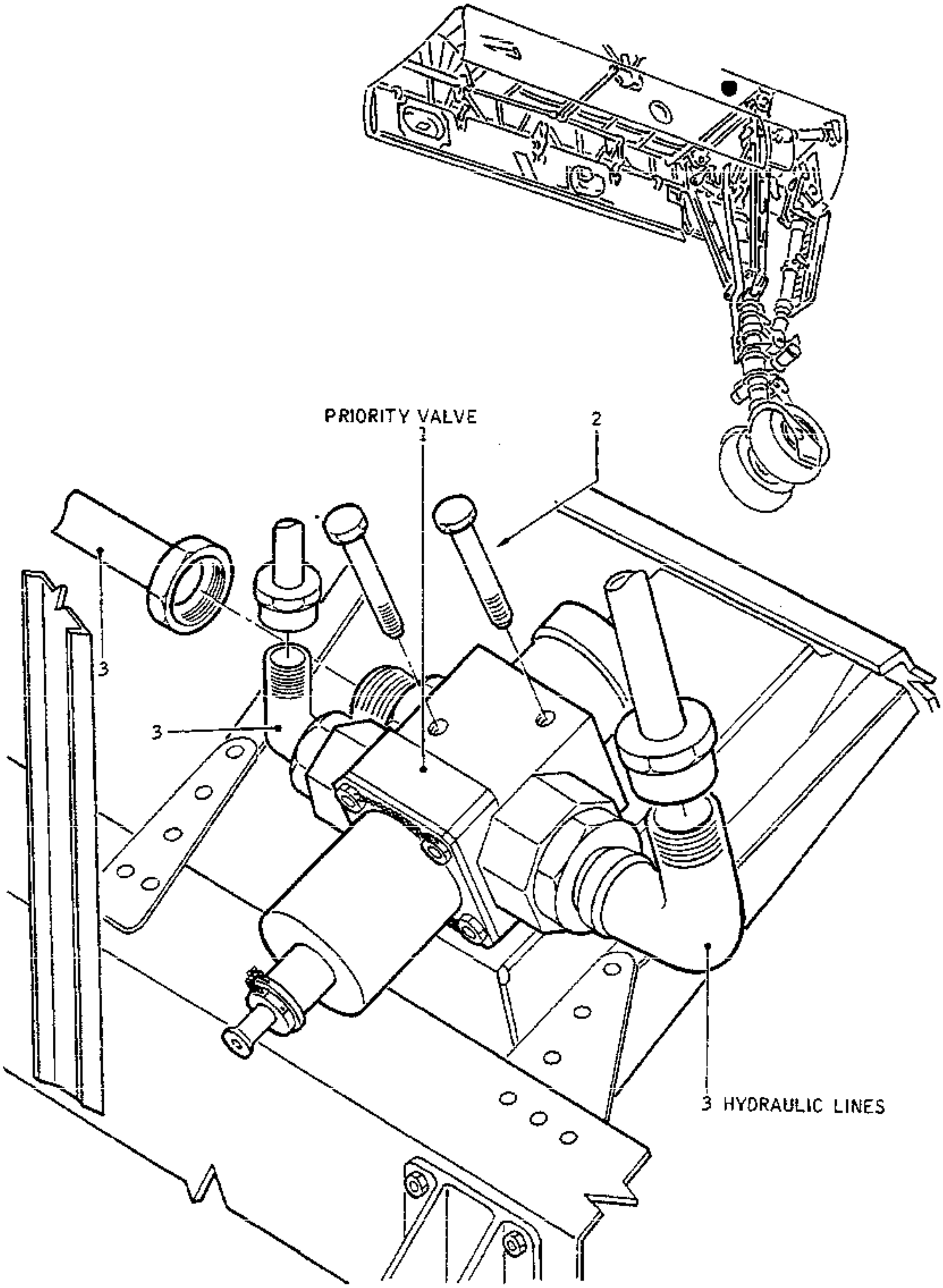
(2) Remove blanking plugs/caps and connect hydraulic lines (3) to valve.

(3) Remove safety sleeves E925002000 from nose landing gear door jacks.

(4) Remove warning notices.

(5) Reset circuit breakers tripped in "Prepare" paragraph.

(6) Replenish hydraulic tanks as required.



CMA 29 21 21 4 AAMO

Priority Valve
Figure 401

F. Tests

Perform test described in 29-21-21, Adjustment/Test. During test, check for leakage.

G. Close-Up

(1) Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(2) Close nose landing gear doors (Ref. 32-00-00, Servicing).

(3) Close access doors 151DB and 153BB.

(4) Remove access platform.

Printed in England

PRIORITY VALVE - ADJUSTMENT/TEST

WARNING : MAKE CERTAIN THAT THE POSITIONS OF NOSE AND MAIN GEAR DOORS CORRESPOND WITH THE ACTUAL POSITIONS OF THE RESPECTIVE OPERATING HANDLES.
HANDLE LOCKED, INDICATOR PLATE SHOWING WHITE : DOORS CLOSED.
HANDLE LOCKED, INDICATOR PLATE SHOWING RED : DOORS OPEN.

MAKE CERTAIN THAT THE LANDING GEAR POSITION INDICATED ON THE GEARS POSITION INDICATING UNIT CORRESPONDS WITH THE ACTUAL POSITION OF THE LANDING GEAR.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE, MAKE CERTAIN THAT THE TRAVEL RANGES OF THE CONTROL SURFACES ARE CLEAR.

BEFORE PRESSURIZING HYDRAULIC SYSTEMS, CHECK THAT ALL CONTROLS ARE SET TO CORRESPOND WITH THE ACTUAL POSITION OF THE SERVICES THEY OPERATE.

MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

1. General

The following procedure is for checking the priority valve for correct operation.

2. Tests

A. Equipment and Materials

DESCRIPTION	PART NO.
Safety Sleeve - Nose Undercarriage Doors	E925002000
Electrical Ground Power Unit	
Ground Power Unit - Hydraulic Power and Preliminary Testing	EMH 398E
Access Platform, 5ft. 11 in. (1.8 m)	
Safety Clips	

B. Prepare

(1) Take the precautions described in the previous WARNING paragraph.

(2) On First Officer's instrument panel, check that landing gear Normal control lever is in NEUTRAL position.

(3) On centre console, check that landing gear and door Emergency control lever is in NEUTRAL position.

(4) Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing).

(5) Make certain that the following circuit breaker is closed :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
UC POSN IND	1-213	G 51	N16

(6) Trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
UC RAISE DOORS CLOSE SUP	15-215	G 1	A 6
UC SELECTOR RAISE CONT		G 2	A 7
UC LOWER DOORS OPEN SUP		G 3	A 8
UC SELECTOR LOWER CONT		G 4	A 9

(7) Connect hydraulic ground power unit to Yellow system (Ref. 29=21-00, Servicing).

CAUTION : MAKE CERTAIN THAT LANDING GEAR AND DOOR TRAVEL RANGES ARE CLEAR.

C. Test

(1) On centre console, place landing gear and door Emergency control lever in DOORS position.

(2) Operate hydraulic ground power unit to slowly build up Yellow system pressure.

R

(3) Check that nose and main landing gear door uplocks release when pressure reaches 2610 +72 -145 psi (180 +5 -10 bar). Door uplocks must not release before this pressure is reached.

(4) Maintain pressure

(a) Nose and main landing gear doors open.

(b) On First Officer's instrument panel, on gears position indicating unit, check that the red lights corresponding to green LH, RH and NOSE arrows, come on.

(5) On centre console, place landing gear and door Emergency control lever in NEUTRAL position.

(6) Shut down hydraulic ground power unit and depressurize Yellow system (Ref. 29-21-00, Servicing).

(7) Trip, safety and tag the following circuit breaker:

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
HYD GRND CHECK OUT SEL VALVE CONT	15-216	M 626	F22

<u>WARNING</u>: DISPLAY WARNING NOTICES ON ENGINES 1, 2 AND 3 PROHIBITING PRESSURIZATION OF GREEN, BLUE AND YELLOW HYDRAULIC SYSTEMS BY HYDRAULIC GROUND POWER UNIT. DISPLAY A WARNING NOTICE AT FLIGHT ENGINEER'S STATION PROHIBITING USE OF GROUND PRESSURIZING SYSTEM ELECTRIC PUMPS. IF A HYDRAULIC GROUND POWER UNIT IS CONNECTED TO THE AIRCRAFT, DISPLAY A WARNING NOTICE ON UNIT PROHIBITING PRESSURIZATION OF AIRCRAFT HYDRAULIC SYSTEMS.

PRINTED IN ENGLAND

(8) Install safety sleeves E925002000 on nose landing gear door jacks.

(9) Check for external leakage on priority valve.

D. Close-Up

(1) Remove safety sleeves E925002000.

(2) Remove safety clips and tags and reset the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
UC RAISE DOORS CLOSE SUP	15-215	G 1	A 6
UC SELECTOR RAISE CONT		G 2	A 7
UC LOWER DOORS OPEN SUP		G 3	A 8
UC SELECTOR LOWER CONT		G 4	A 9
HYD GRND CHECK OUT SEL VALVE CONT	15-216	M 626	F22

(3) Remove warning notices.

(4) Pressurize Green hydraulic system (Ref. 29-11-00, Servicing).

CAUTION : MAKE CERTAIN THAT LANDING GEAR AND DOOR TRAVEL RANGES ARE CLEAR.

(5) On First Officer's instrument panel, place landing gear Normal control lever in DOWN position.

(a) Nose and main landing gear doors close.

(b) On First Officer's instrument panel, on gears position indicating unit, check that the four green arrows are illuminated and that the corresponding red lights are extinguished.

(6) On First Officer's instrument panel, place landing gear Normal control lever in NEUTRAL position.

(7) Shut down hydraulic power source and depressurize Green system (Ref. 29-11-00, Servicing).

(8) De-energize the aircraft electrical network (Ref. 24-41-00, Servicing).

(9) Remove hydraulic and electrical ground power units.

(10) Remove access platform.

HYDRAULIC POWER ACCUMULATOR - REMOVAL/INSTALLATION

WARNING : MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE MAKE CERTAIN THAT THE TRAVEL RANGES OF THE ELEVONS ARE CLEAR.

1. General

The Yellow system accumulator is located in zone 151 and is accessible through access door 151DB.

R NOTE : If the accumulator is replaced due to insufficient pre-
R load Nitrogen pressure, the Hydraulic Tank De-Aerator
R Safety Valve is to be checked for clogging indication.

2. Accumulator

A. Equipment and Materials

DESCRIPTION	PART NO.
Blanking Plugs/Caps for Hydraulic Lines	
Circuit Breaker Safety Clips	
Access Platform - 9 ft.8 in. (2.96 m)	

B. Prepare

(1) Trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
HYD GRND CHECK OUT SEL VALVE CONT	15-216	M 626	F22
HYD TANK COMPR CONT	15-215	M 602	D 8

(2) Open access door 153BB under fuselage and depressurize Yellow system tank (Ref. 29-13-00, Servicing).

(3) Open access door 151DB under fuselage and depressurize Yellow system by actuating control lever of associated pressure relief and manual unloading valve (Ref. 29-21-00, Servicing).

(4) Close tank depressurization valve, and secure with safety pin.

C. Remove

(1) Slowly release accumulator nitrogen pressure.

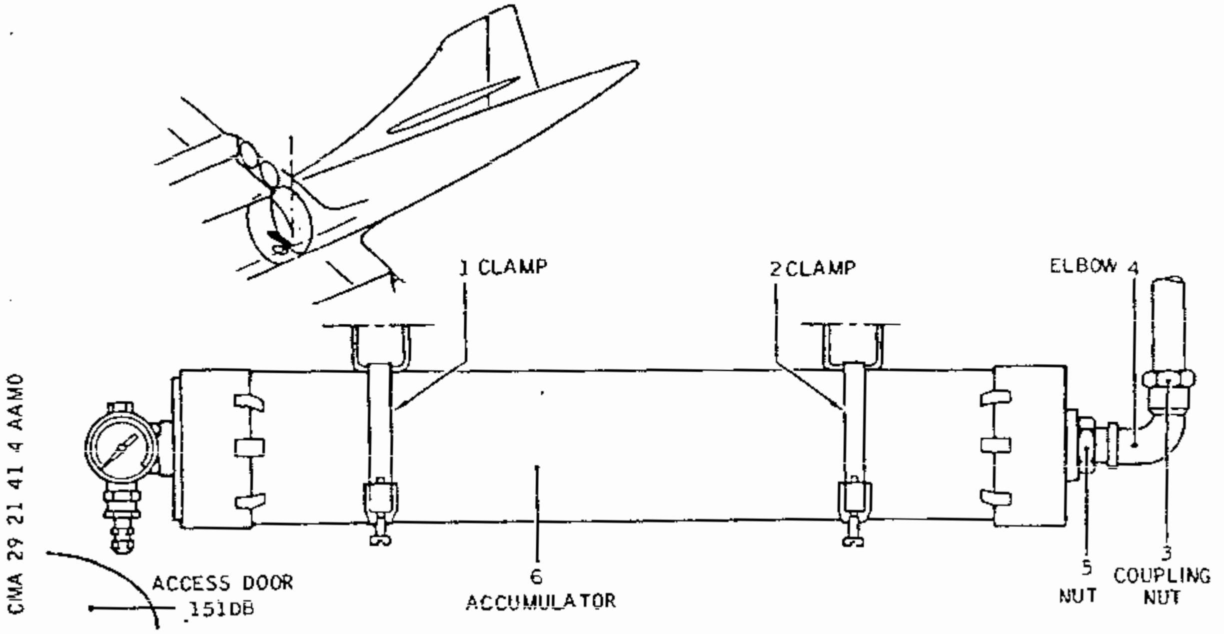
(2) Unscrew coupling nut (3).

(3) Loosen clamps (1) and (2) so that they can be withdrawn from their supports.

(4) Support accumulator, disengage clamps (1) and (2) from their supports.

(5) Remove accumulator.

(6) Cap open line ends.



Hydraulic Power Accumulator
Figure 401

D. Preparation of Replacement Component

(1) Loosen nut (5).

(2) Remove elbow (4) from removed accumulator.

(3) Change seals.

(4) Correctly position elbow (4) and install on replacement accumulator.

(5) Tighten nut (5).

E. Install

(1) Position accumulator for installation and fit clamps (1) and (2) on their supports.

(2) Remove blanking plugs/caps.

(3) Make certain that accumulator is correctly positioned and connect hydraulic lines.

(4) Tighten clamps (1) and (2).

(5) Tighten coupling nut (3).

(6) Charge accumulator with nitrogen (Ref. 29-00-00, Servicing).

(7) Replenish tank as required (Ref. 12-12-29).

F. Tests

When next pressurizing the system, check the installation for leakage.

G. Close-Up

(1) Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(2) Clean the accumulator and adjacent area and make certain that no trace of hydraulic fluid remains.

(3) Remove safety clip and tag and reset circuit breakers.

(4) Close access doors.

(5) Remove access platform.

HYDRAULIC SHUT-OFF VALVE - REMOVAL/INSTALLATION

WARNING : MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE, MAKE CERTAIN THAT THE TRAVEL RANGES OF THE ELEVONS ARE CLEAR.

1. General

The removal/installation procedure described in this topic is valid for both shut-off valves in the Yellow system.

2. Shut-Off Valves

A. Equipment and Materials

DESCRIPTION	PART NO.
Wing Protective Mats	
Blanking Plugs/Caps for Hydraulic Lines	
Access Platform - 13 ft. 7 in. (4.06 metres)	
Container - Capacity 15 litres (3.80 US Gal, 3.30 Imp. Gal)	
Hydraulic Tank Pressurizing Equipment (Air Bottle with Pressure Reducing Valve)	
Hydraulic Fluid (Ref. 20-30-00, No.011)	
Corrosion Resistant Steel Lockwire, R Dia. 0.041 in. (1 mm)	
Drainage Equipment - Hydraulic R Fluid/Fuel Heat Exchanger	D921595000

B. Prepare

(1) Open access door 531BT on LH wing, or access door 632CT on RH wing.

(2) Open access door 153BB under fuselage and depressurize Yellow system tank by opening associated depressurization valve.

(3) Open access door 151DB under fuselage and depressurize Yellow system by actuating control lever of associated pressure relief and manual unloading valve.

(4) Trip, safety and tag the following circuit-breakers:

(a) For engine 2 shut-off valve :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
ENG2 SHUT-OFF VALVES CONT	2-213	W 7	B15
SHUT-OFF VALVES IND	15-216	W 5	C18
HYD GRND CHECK OUT SEL VALVE CONT		M 626	F22

(b) For engine 4 shut-off valve :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
R ENG4 SHUT-OFF VALVES CONT	4-213	W 8	C10
SHUT-OFF VALVES IND	15-216	W 6	C19
HYD GRND CHECK OUT SEL VALVE CONT		M 626	F22

(5) Remove blanking plug (2) and open bleed valve (3) on shut-off valve.

(6) Open panel 426AB or 446AB on engine 2 or engine 4 (Ref. 71-00-00, Servicing). Disconnect hydraulic pump suction line at self-sealing coupling.

(7) Install drainage equipment and allow hydraulic fluid to flow into container provided.

(8) Connect tank pressurizing equipment to ground connector 0191, zone 153.

C. Remove

(1) Disconnect electrical connector (4).

(2) Disconnect hydraulic suction line (1).

(3) Cut and remove lockwire and remove bolts (5) and (8), remove bonding strip.

(4) Remove shut-off valve.

(5) Cap open line ends.

D. Preparation of Replacement Component

E. Install

(1) Remove blanking caps.

(2) Replace shut-off valve seal (7) (lubricate seal with Product No.011).

(3) Position shut-off valve.

CAUTION : DO NOT DAMAGE SEAL.

(4) Secure shut-off valve with bolts (5) and (8) without tightening. Do not omit washers (6) and bonding strip.

(5) Connect hydraulic suction line (1).

(6) Fully tighten and dry torque bolts (5) and (8) to
R between 0.80 and 0.95 m.daN (70.776 and 84.046 lbf. in.). Wirelock.

(7) Tighten hydraulic suction line (1).

(8) Connect electrical connector (4).

(9) Disconnect drainage equipment.

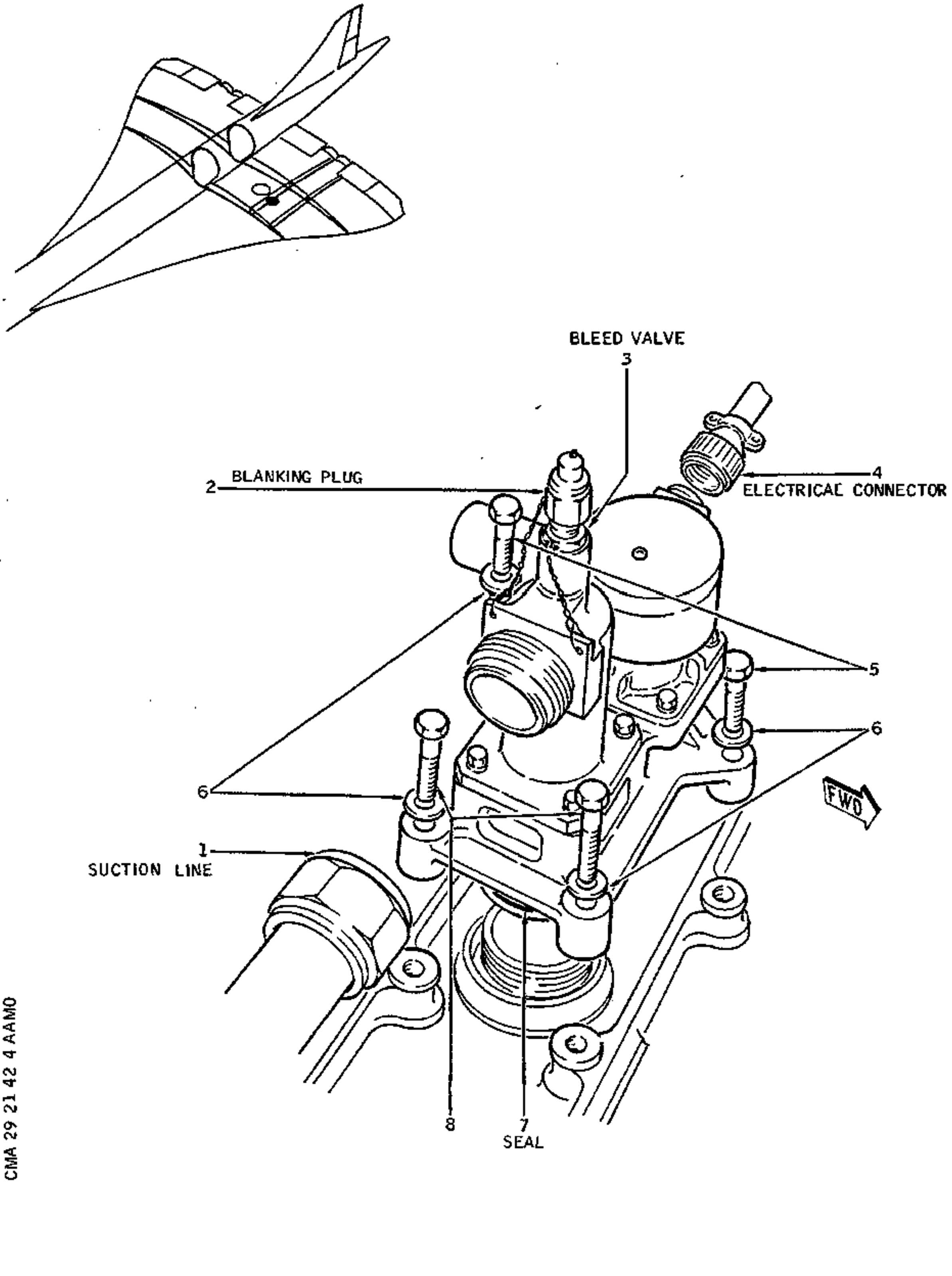
(10) Connect pump suction line to self-sealing coupling.

(11) Remove safety clips and tags, and reset circuit-breakers.

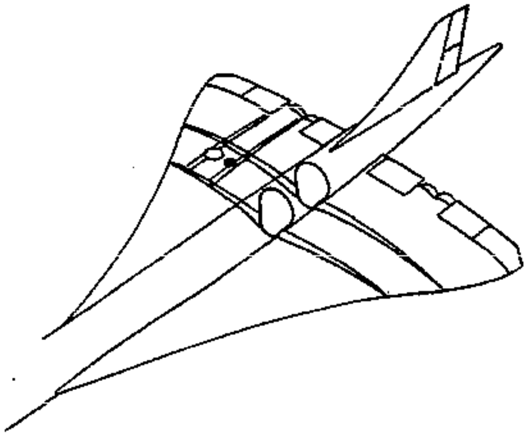
R (12) Close tank depressurization valve, and secure with a
R safety pin.

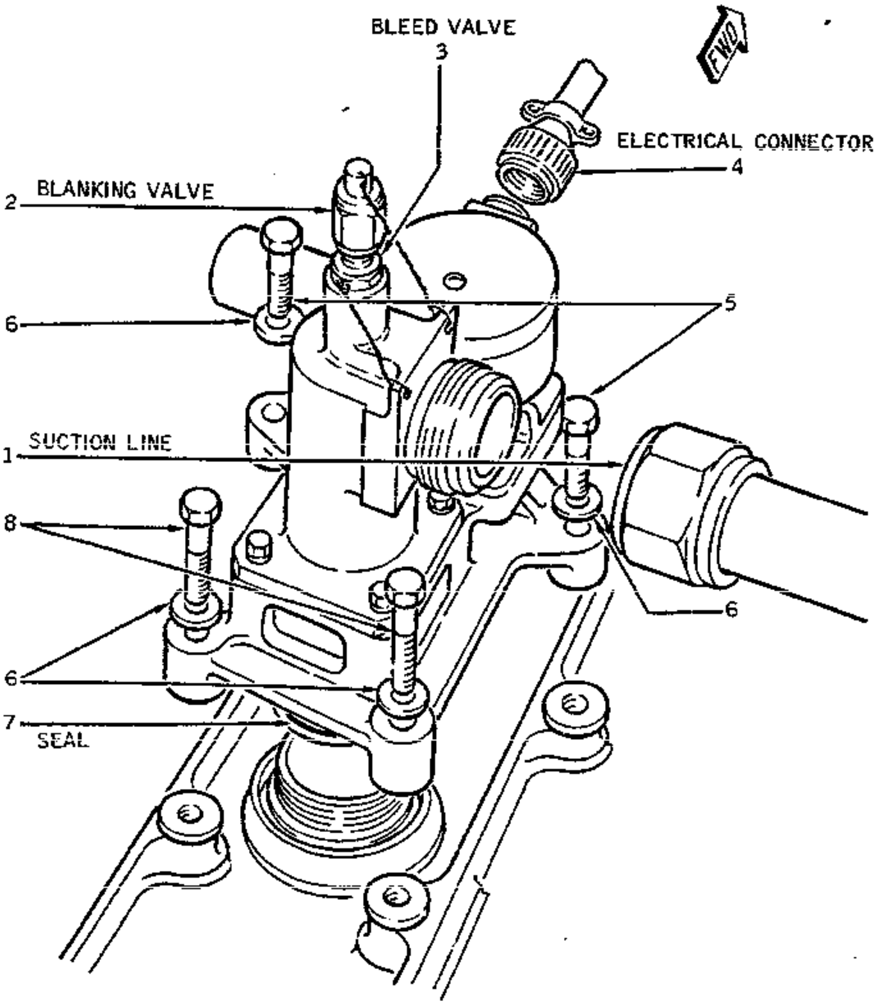
R (13) Bleed pump suction line (Ref. 29-21-00, Servicing).

R (14) Fully tighten and wet torque shut-off valve bleed valve
R with Product No.011 to between 0.40 and 0.55 m.daN



Engine 2 Shut-Off Valve
Figure 401





CMA 29 21 42 4 ACMO

Engine 4 Shut-Off Valve
Figure 402

R (35 and 49 lbf.in.). Wirelock.

(15) Position blanking plug on bleed valve, and wirelock.

R (16) Replenish hydraulic tank as required (Ref. 12-12-29).

(17) Clean shut-off valve and adjacent area. Make certain that no trace of hydraulic fluid remains.

F. Tests

R (1) Pressurize hydraulic tanks to 70 psi (4.8 bars), and check for external leakage on shut-off valve.

R (2) Test shut-off valve (Ref. 29-21-42, Adjustment/Test).

G. Close-Up

R (1) Disconnect and remove tank pressurizing equipment.

(2) Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(3) Close access doors.

R (4) Close engine panel (Ref. 71-00-00, Servicing).

(5) Remove wing protective mat.

(6) Remove wing access platform.

HYDRAULIC SHUT-OFF VALVE - ADJUSTMENT/TEST

1. General

The shut-off valves, which are mounted on the hydraulic pump suction line, enable the supply of hydraulic fluid to be cut off in the event of an engine fire.

R CAUTION : THE HYDRAULIC SYSTEMS MUST NOT, UNDER ANY CIRCUMSTANCES, BE PRESSURIZED BY A HYDRAULIC GROUND POWER UNIT DURING THESE TESTS.

2. Operational Test

Check for correct operation of the shut-off valves.

A. Equipment and Materials

DESCRIPTION	PART NO.
Electrical Ground Power Unit	

B. Prepare

(1) Make certain that the following circuit breakers are set :

R Engine 2 Yellow system shut-off valve

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
ENG 2 SHUT OFF VALVES CONT	2-213	W 07	B15
SHUT OFF VALVES IND	15-216	W 05	C18

Engine 4 Yellow system valve

SERVICE	PANEL	CIRCUIT BREAKE	MAP REF.
ENG 4 SHUT OFF VALVES CONT	04-213	W 08	C10

SERVICE	PANEL	CIRCUIT BREAKE	MAP REF.
SHUT OFF VALVES IND	15-216	W 06	C19

(2) Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing).

C. Test

(1) On Flight Engineer's HYDRAULIC MANAGEMENT panel, place YELLOW switches 2 and 4 in SHUT position.

SHUT-OFF VALVES-YELLOW-2 and 4 magnetic indicators must display stripes throughout transit of the valves, and then SHUT.

(2) On Flight Engineer's HYDRAULIC MANAGEMENT panel place YELLOW switches 2 and 4 in ON position.

SHUT-OFF VALVES-YELLOW-2 and 4 magnetic indicators must display stripes throughout transit of the valves, and then OPEN.

D. Close-Up

De-energize the aircraft electrical network and disconnect electrical ground power unit (Ref. 24-41-00, Servicing).

3. Functional Test

Check for correct operating condition of shut-off valves.

A. Equipment and Materials

DESCRIPTION	PART NO.
Electrical Ground Power Unit	
Access Platform - 13 ft. 7 in. (4.06 metres)	
Wing Protective Mats	

B. Prepare

(1) Make certain that the following circuit breakers are set :

R Engine 2 Yellow system shut-off valve

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
ENG 2 SHUT OFF VALVES CONT	2-213	W 07	B15
SHUT OFF VALVES IND	15-216	W 05	C18

Engine 4 Yellow system valve

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
ENG 4 SHUT OFF VALVES CONT	04-213	W 08	C10
SHUT OFF VALVES IND	15-216	W 06	C19

(2) Open access doors 531BT and 632CT.

(3) On ENGINE FIRE CONTROLS overhead panel, make certain that fire control handles are in normal position (pushed in).

(4) Connect electrical ground power unit and energize the
R aircraft electrical network (Ref. 24-41-00, Servicing).

C. Test

(1) On Flight Engineer's HYDRAULIC MANAGEMENT panel, place YELLOW switches 2 and 4 in SHUT position. SHUT-OFF VALVES-YELLOW-2 and 4 magnetic indicators must display stripes throughout transit of the valves, and then SHUT when the valves close.

In zones 531 and 632 the shut-off valves must close, and this condition must be indicated by their mecha-
R nical indicators.

(2) On Flight Engineer's HYDRAULIC MANAGEMENT panel, place YELLOW switches 2 and 4 in OFF position.

SHUT-OFF VALVES-YELLOW-2 and 4 magnetic indicators must display stripes throughout transit of the valves, and then OPEN when valves open.

In zones 531 and 632, the shut-off valves must open, and this condition must be indicated by their mecha-
R nical indicators.

(3) On Flight Engineer's HYDRAULIC MANAGEMENT panel, place YELLOW switches 2 and 4 in ON position.

No change. The results are the same as in (2) above.

(4) On ENGINE FIRE CONTROLS overhead panel, pull out engines 2 and 4 ENGINE FIRE control handles.

On Flight Engineer's HYDRAULIC MANAGEMENT panel, SHUT-OFF VALVES-YELLOW-2 and 4 magnetic indicators must display stripes throughout transit of the valves, and then SHUT when the valves close.

In zones 531 and 632 the shut-off valves must close, and this condition must be indicated on their mecha-
R nical indicators.

(5) On ENGINE FIRE CONTROLS overhead panel, push in engines 2 and 4 ENGINE FIRE control handles.

On Flight Engineer's HYDRAULIC MANAGEMENT panel, SHUT-OFF VALVES-YELLOW-2 and 4 magnetic indicators must display stripes throughout transit of the valves, then OPEN when the valves open.

In zones 531 and 632 the shut-off valves must open, and this condition must be indicated by their mechanical indicators.

D. Close-Up

(1) Close access doors.

(2) Remove wing protective mats and access platform.

(3) De-energize the aircraft electrical network and disconnect electrical ground power unit. (Ref. 24-41-00, Servicing).

SAMPLING VALVE - REMOVAL/INSTALLATION

1. General

The sampling valve is located in the upper part of zone 151.

2. Sampling Valve

A. Equipment and Materials

DESCRIPTION	PART NO.
Container for Recovery of Hydraulic Fluid	
Corrosion-Resistant Steel Lockwire, Dia. 0.032 in. (0.8 mm)	
Access Platform	
Blanking Plugs/Caps	

B. Prepare

(1) Open access door 151DB, and depressurize Yellow system (Ref. 29-21-00, Servicing).

(2) Open access door 153BB, and depressurize Yellow system tank (Ref. 29-13-00, Servicing).

(3) Trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
HYD GRND CHECK OUT SEL VALVE CONT	15-216	M 626	F22
HYD TANK COMPR CONT	15-215	M 602	D 8

(4) Display a warning notice on engine 2 prohibiting pressurization of Yellow hydraulic system.
Display a warning notice at Flight Engineer's station prohibiting use of ground pressurizing system electric pumps.

If a hydraulic ground power unit is connected to the aircraft, display a warning notice on the unit prohibiting pressurization of the aircraft hydraulic system.

C. Remove

(1) Cut and remove lockwire.

R (2) Remove sampling valve (1) from union (3).

(3) Plug/cap open ports of union and sampling valve.

D. Preparation of Replacement Component

R (1) Cut and remove lockwire, remove cap (4) from sampling valve.

(2) Check that valve is closed.

(3) Install cap on valve, moderately tighten by hand, and wirelock (Ref. 20-21-13).

E. Install

(1) Remove blanking plugs/caps.

(2) Place O-ring gasket (2) on sampling valve (1).

R (3) Install sampling valve (1) in union (3). Torque to 7.9 ± 0.05 m.daN (58.26 ± 0.36 lbf.ft.).

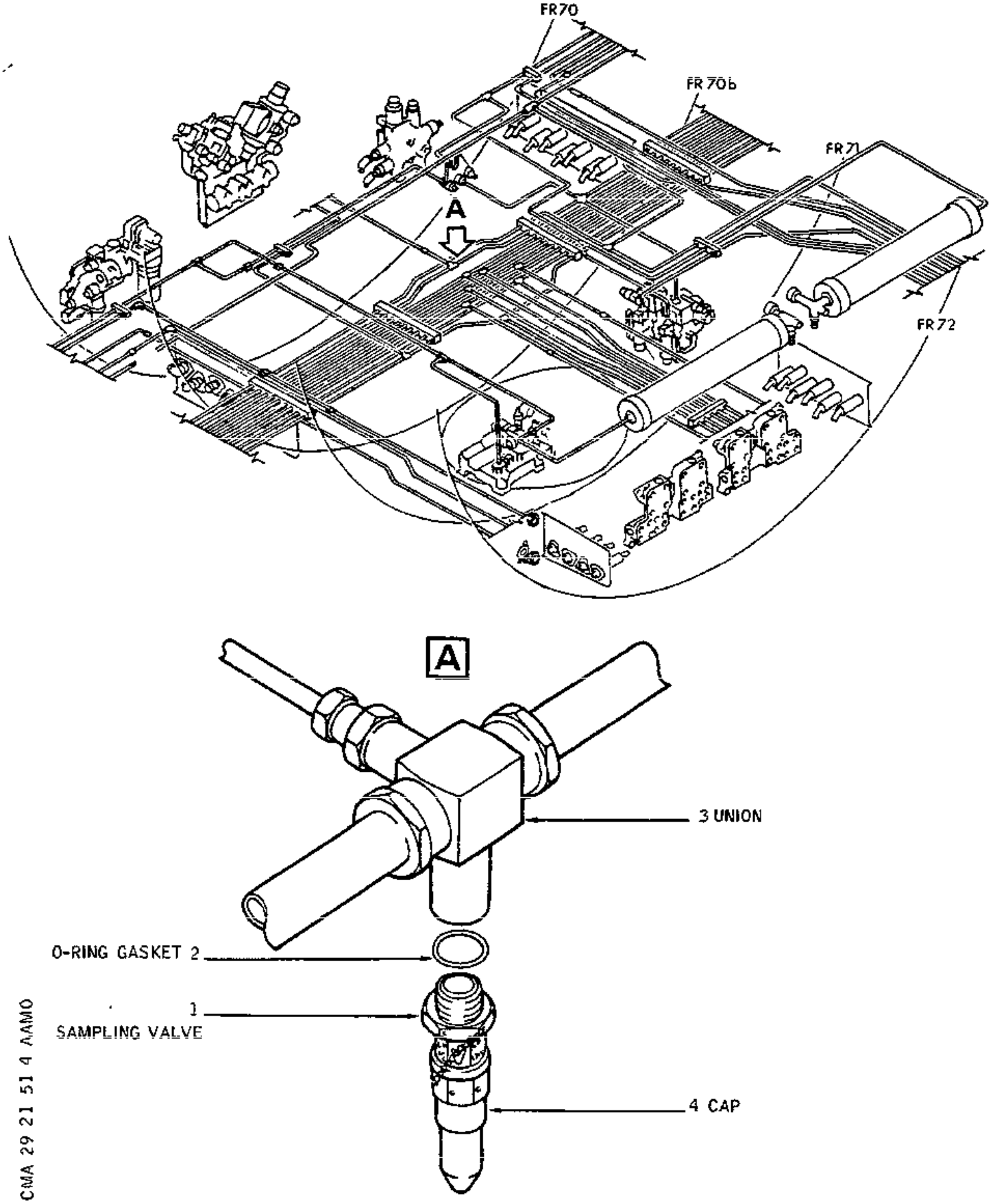
R (4) Wirelock sampling valve (1) (Ref. 20-21-13).

(5) Remove safety clips and tags and reset the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
HYD GRND CHECK OUT SEL VALVE CONT	15-216	M 626	F22
HYD TANK COMPR CONT	15-215	M 602	D 8

(6) Remove warning notices.

F. Test



CMA 29 21 51 4 AAMO

Sampling Valve
Figure 401

R

(1) Pressurize Yellow hydraulic system (Ref. 29-21-00, Servicing).

(2) Check sampling valve for leakage.

(3) Shut down hydraulic power source (Ref. 29-21-00, Servicing).

G. Close-Up

(1) Clean the sampling valve and adjacent area, and make certain that no trace of hydraulic fluid remains.

(2) Make certain that working area is clear of tools and miscellaneous items of equipment.

(3) Close access doors 151DB, 153BB.

(4) Remove access platforms.

HYDRAULIC TANK ASSEMBLY - REMOVAL/INSTALLATION

WARNING : MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE MAKE CERTAIN THAT THE TRAVEL RANGES OF THE ELEVONS ARE CLEAR.

1. General

The Yellow system hydraulic tank is located in zone 153 and is accessible through door 153AB.
This topic describes the removal/installation procedure for :

- The complete tank assembly
- The removable electric sub-assembly of the quantity transmitter/direct reading indicator assembly.

2. Tank Assembly - Hydraulic

A. Equipment and Materials

DESCRIPTION	PART NO.
Drain Hose - Hydraulic Tanks	D925190000
Circuit Breaker Safety Clips	
Blanking Plugs/Caps for Hydraulic Lines	
Access Platform - 9 ft.8 in. (2.96 metres)	
Container	

B. Prepare

(1) Open access doors 153BB and 153AB under fuselage and depressurize Yellow system tank.

(2) Open access door 151DB under fuselage and depressurize Yellow system by actuating control lever of associated pressure relief and manual unloading valve.

(3) Trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
YELL TANK CONTENTS IND	13-216	D 42	B12
HYD GRND CHECK OUT PUMP CONT	14-216	M656	A16
YELL LL O/HEAT IND	15-215	G261	C 9
HYD TANK COMPR CONT		M602	D 8
HYD GRND CHECK OUT SEL VALVE CONT	15-216	M262	F22
R ** ON A/C 001-006			
HYD FLUID TEMP IND	15-215	D220	D 9

(4) Drain Tank

(a) Remove the two plugs from unions (4) and (5) on drain cock.

(b) Connect tank drain hose to union (4).

(c) Loosen set screw inside union (5) and allow fluid to drain into container provided until tank is completely drained.

(d) Disconnect tank drain hose of union (4).

(e) Tighten the set screw union (5) and install the two plugs on unions (4) and (5) of drain cock.

C. Remove

(1) Disconnect the electrical connector from tank.

(2) Mark and then remove clamps (6) securing hydraulic lines on tank.

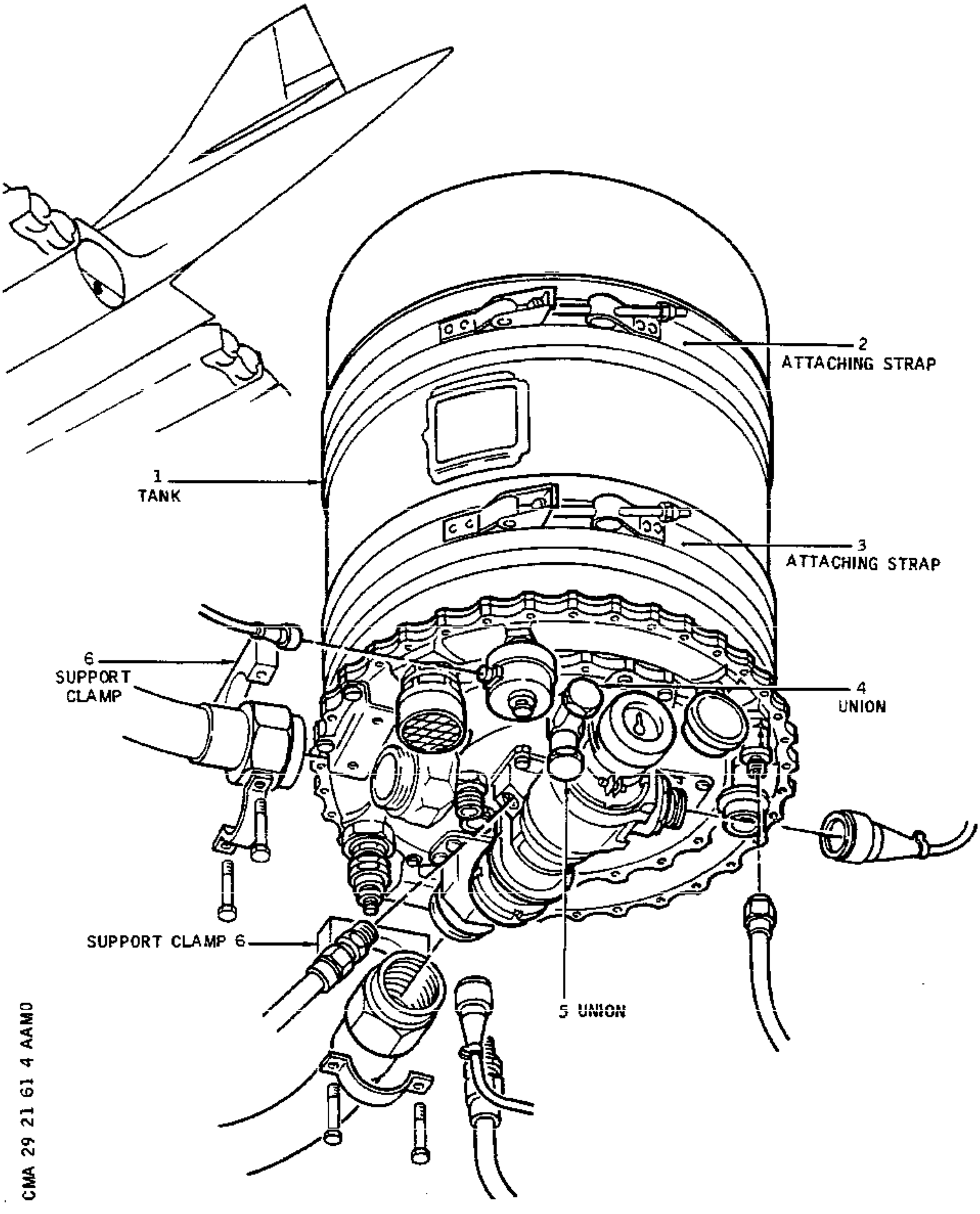
(3) Remove all lines connected to tank.

(4) Cap open line ends and tank ports.

(5) Uncouple attaching straps (2) and (3).

(6) Remove tank (1).

PRINTED IN ENGLAND



R

Hydraulic Tank Assembly
Figure 401

D. Preparation of Replacement Component.

R (1) Check that replacement unit is filled with product No.11.

E. Install

(1) Drain replacement tank.

(2) Position tank and attach it to its supports by means of straps (2) and (3). Do not tighten.

(3) Connect electrical connectors to tank.

(4) Remove blanking caps.

(5) Position and connect hydraulic lines but do not tighten.

(6) Install line support clamps (6).

(7) Fully secure tank by tightening straps (2) and (3).

(8) Tighten all hydraulic lines.

(9) Tighten line support clamps (6).

R WARNING: IF TANK HAS BEEN DRAINED THROUGH DRAIN COCK, TIGHTEN
R THE SET SCREW AND INSTALL THE TWO PLUGS.

(10) Replenish tank (See 12-12-29).

F. Tests

(1) (Ref. 29-32-00 and 29-33-00, Adjustment/Test).

(2) After tests, check for external leakage on lines.

G. Close-up

(1) Clean hydraulic tank and adjacent area and make certain that no trace of hydraulic fluid remains.

(2) Make certain that working area is clear of tools and miscellaneous items of equipment.

(3) Remove safety clips and tags, and rest circuit breakers.

(4) Close access doors.

(5) Remove access platform.

3. Electric Sub-Assembly - Quantity Transmitter/Direct Reading Indicator

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform, 9 ft. 8 in. (2.96 m)	
Circuit Breaker Safety Clips	

R B. Prepare

(1) Open access doors 153AB and 153BB under fuselage.

(2) Trip, safety and tag the following circuit breaker :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
YELL TANK CONTENTS IND	13-216	D 42	B12

C. Remove

(1) Disconnect electrical connector (2).

(2) Loosen attaching screw on clamp (1), disengage clamp from bracket (5).

(3) Loosen attaching screw on clamp (4), disengage clamp from mating flanges of hydraulic sub-assembly (6) and electric sub-assembly (3).

(4) Remove electric sub-assembly (3), remove and retain clamps (1) and (4).

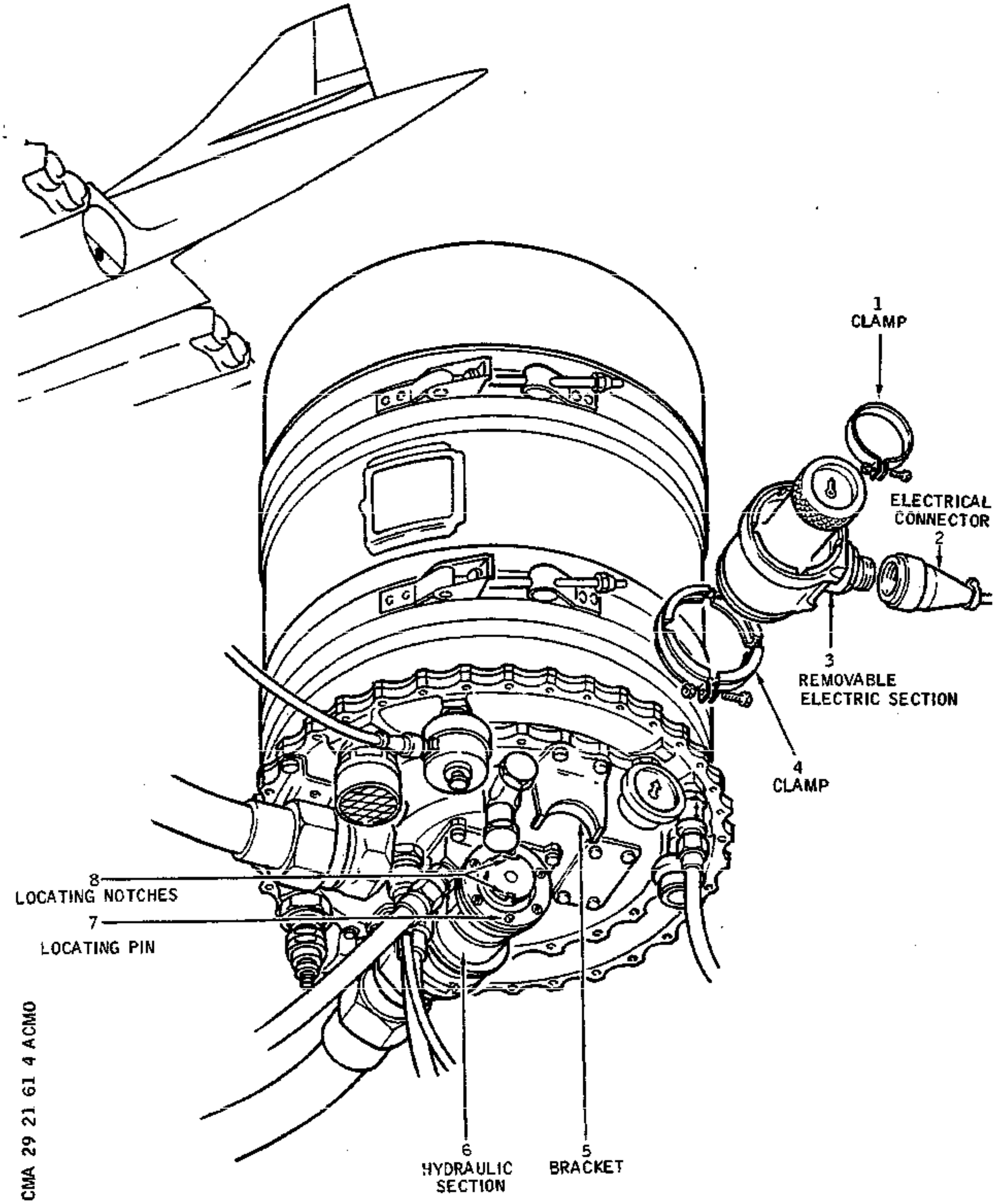
D. Preparation of Replacement Component

NOTE : It is essential to use electric and hydraulic sub-assemblies intended for the Yellow tank.

E. Install

(1) Position removable electric sub-assenbly (3) on fixed hydraulic sub-assembly.

NOTE : Locating pin (7) on mating flange of hydraulic



Removable Electric Sub-Assembly of Tank Quantity
Transmitter/Direct Reading Indicator Assembly
R Figure 402

sub-assembly, and locating notches (8) on movable drive parts, ensure foolproof installation of electric sub-assembly on hydraulic sub-assembly.

(2) Install clamp (4) and fully tighten attaching screw.

(3) Install clamp (1) and fully tighten attaching screw.

(4) Connect electrical connector (2).

(5) Remove safety clip and tag, and reset circuit breaker D42.

F. Test

Perform a functional test (Ref. 29-32-00, Adjustment/Test).

G. Close-Up

(1) Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(2) Close all access doors.

(3) Remove access platform.

R HYDRAULIC TANK RETURN FILTER ASSY - REMOVAL/INSTALLATION

WARNING : MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE, MAKE CERTAIN THAT THE TRAVEL RANGES OF THE ELEVONS ARE CLEAR.

1. General

Removal/Installation for replacement.

2. LP Filter

A. Equipment and Materials

DESCRIPTION	PART NO.
Drain Hose - Hydraulic Tanks	D925190000
Container	
Blanking Plugs/Caps for Hydraulic Lines	
Access Platform - 9 ft. 8 in. (2.96 metres)	
Air/Hydraulic Tool Kit	
R Hydraulic Tank Pressurizing Equipment (Air Bottle with Pressure Reducing Valve)	
Circuit Breaker Safety Clips	
R R Drainage Equipment - Return Filter Assy - Hydraulic Tank	D921596000

B. Prepare

(1) Open access door 153AB under fuselage and depressurize
R Yellow system tank.

(2) Open access door 151DB under fuselage and depressurize Yellow system by actuating control lever of associated pressure relief and manual unloading valve.

R (3) Connect tank pressurizing equipment to ground connector (0191) zone 153.

(4) Trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
HYD TANK COMPR CONT	15-215	M 602	D 8
HYD GRND CHECK OUT SEL VALVE CONT.	15-216	M 626	F22

R (5) Remove Yellow tank (Ref. 29-21-61, Removal/Installa-
R tion).

C. Remove

(1) Drain filter (1).

R (a) Remove safety pin (9).

R (b) Connect tank return filter assembly drainage equipment under filter.

R (c) Loosen knurled knob (10), and allow fluid to flow until filter is completely drained.

R (2) Remove nuts (4) from links (7), remove bolts and washers. Remove and retain clamp (5) and the two half-shells (6). Unscrew union nut (8).

(3) Disconnect all lines attached to filter.

(4) Remove split pins, and nuts (3) from bolts (2) which attach filter to mounting.

(5) Support filter and remove bolts (2). Remove and retain shims.

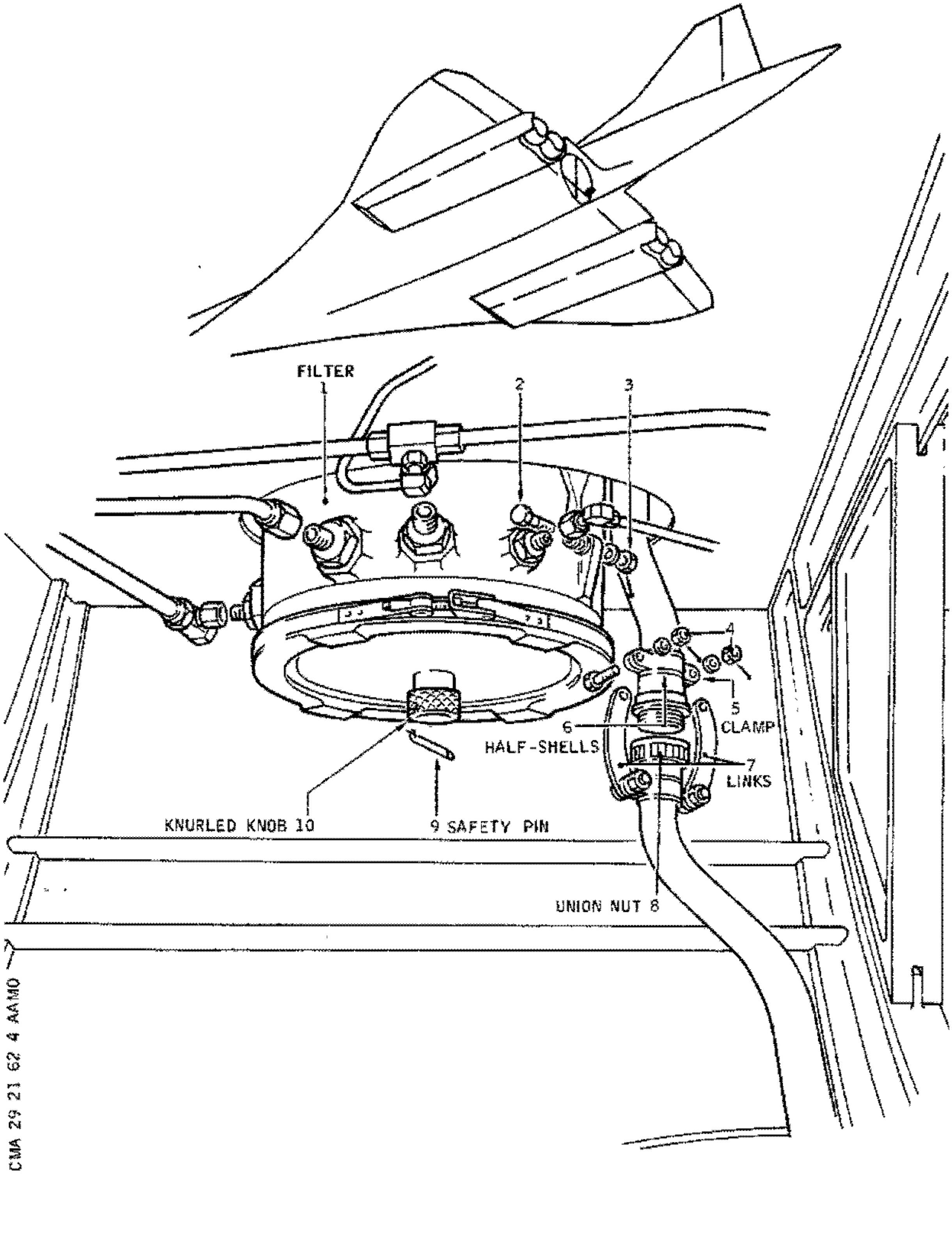
(6) Remove filter (1).

(7) Cap all open line ends.

D. Preparation of Replacement Component

E. Install

(1) Remove blanking caps from hydraulic lines.



R

Tank Return Filter Assembly
Figure 401

R (2) Place filter on its mounting.

R (3) Correctly position filter using shims which are inserted between filter attachment lugs and those on mounting.

NOTE : The thickness of the shims between each attachment lug must not exceed 0.016 in. (0.41 mm).

(4) Secure filter to its mounting with bolts (2), washers and nuts (3). Safety nuts with split pins.

(5) Connect lines to filter.

(6) Tighten union nut (8), install the two half-shells (6), clamp (5) and links (7).

R (7) Install Yellow tank (Ref. 29-21-61, Removal/Installation).

R (8) Pressurize tanks to 70 psi (4.8 bars) (Ref. 29-13-00, Servicing).

R (9) Check lines for external leakage.

F. Close-Up

R

R (1) Clean filter, tank and adjacent area, and make that no trace of hydraulic fluid remains.

R (3) Make certain that working area is clear of tools and miscellaneous items of equipment.

R (4) Check for external leakage.

(5) Close access doors.

(6) Remove access platform.

(7) Reset circuit breakers.

PRINTED IN ENGLAND

ENGINE-DRIVEN HYDRAULIC PUMP - REMOVAL/INSTALLATION

WARNING: MAKE CERTAIN THAT THE POSITION OF NOSE AND MAIN GEAR DOORS CORRESPOND WITH THE ACTUAL POSITIONS OF THE RESPECTIVE OPERATING HANDLES.
HANDLE LOCKED, INDICATOR PLATE SHOWING WHITE : DOORS CLOSED.
HANDLE LOCKED, INDICATOR PLATE SHOWING RED : DOORS OPEN.

MAKE CERTAIN THAT THE LANDING GEAR POSITION INDICATED ON THE GEARS POSITION INDICATING UNIT CORRESPONDS WITH THE ACTUAL POSITION OF THE LANDING GEAR.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE, MAKE SURE THAT THE TRAVEL RANGES OF THE CONTROL SURFACES ARE CLEAR.

BEFORE PRESSURIZING HYDRAULIC SYSTEMS, CHECK THAT ALL CONTROLS ARE SET TO CORRESPOND WITH THE ACTUAL POSITION OF THE SERVICES THEY OPERATE.

MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

1. General

This topic details the removal/installation procedure for the engine-driven hydraulic pumps and for the pump drive shafts.

The procedure applies to both engine-driven pumps in the Yellow System.

RB CAUTION: WHEN REPLACING THE PUMP FOR ANY REASON THE CASE DRAIN
RB FILTER ELEMENT MUST ALSO BE CHANGED. THIS MUST BE
RB DONE BEFORE THE REPLACEMENT PUMP IS OPERATED. REFER
RB TO 29-00-00, GENERAL SERVICING, PARAS. 2 AND 3 FILTER
RB ELEMENTS.

2. Pumps - Engine-driven Hydraulic

A. Equipment and Materials

DESCRIPTION	PART NO.
Special Products (Ref. 20-30-00, No.118)	-
Corrosion-Resistant Steel Lockwire Dia. 0.028 in (0.7 mm)	-
Oils (Ref. 20-30-00, No.021)	-

DESCRIPTION	PART NO.
Electrical Ground Power Unit	-
Mobile Access Platform for Under Nacelle, 5 ft 11 in (1.8 m)	-
Blanking Plug/Caps for Hydraulic Unions	-
R Hydraulic Fluid (Ref. 20-30-00, No.011)	-
Container for Recovery of Hydraulic Fluid	-

B. Prepare

(1) Open panel 426AB for pump mounted on engine 2 or panel 446AB for pump mounted on engine 4 (Ref. 71-00-00, Servicing).

(2) Depressurize Yellow system (Ref. 29-21-00, Servicing). Depressurize Yellow hydraulic tank (Ref. 29-13-00, Servicing).

(3) Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing).

(4) Make certain that the following circuit breakers are set:

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
ENG 2 SHUT OFF VALVES CONT	2-213	W 07	B15
ENG 4 SHUT OFF VALVES CONT	4-213	W 08	C10
SHUT OFF VALVES IND	15-216	W 05	C18
SHUT OFF VALVES IND		W 06	C19

(5) On Flight Engineer's HYDRAULIC MANAGEMENT panel, place control switch of pump to be removed in SHUT position. Check that associated SHUT OFF VALVES magnetic indicator, located on same panel, displays SHUT.

PRINTED IN ENGLAND

(6) Trip, safety and tag the following circuit breakers:

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
Engine No.2 Pump ENG 2 SHUT OFF VALVES CONT	2-213	W 07	B15
ENG 2 YELL PUMP CONT IND	15-215	M 311	B 8
Engine No.4 Pump ENG 4 SHUT OFF VALVES CONT	4-213	W 08	C10
ENG 4 YELL PUMP CONT IND	15-215	M 312	B 9

(7) Observe the following precautions:

WARNING: DISPLAY WARNING NOTICES ON ENGINE 1 PROHIBITING PRESSURIZATION OF YELLOW HYDRAULIC SYSTEM BY HYDRAULIC GROUND POWER UNIT.

DISPLAY A WARNING NOTICE AT FLIGHT ENGINEER'S STATION PROHIBITING USE OF GROUND PRESSURIZING SYSTEM ELECTRIC PUMPS.

C. Remove
(Ref. Fig. 401)

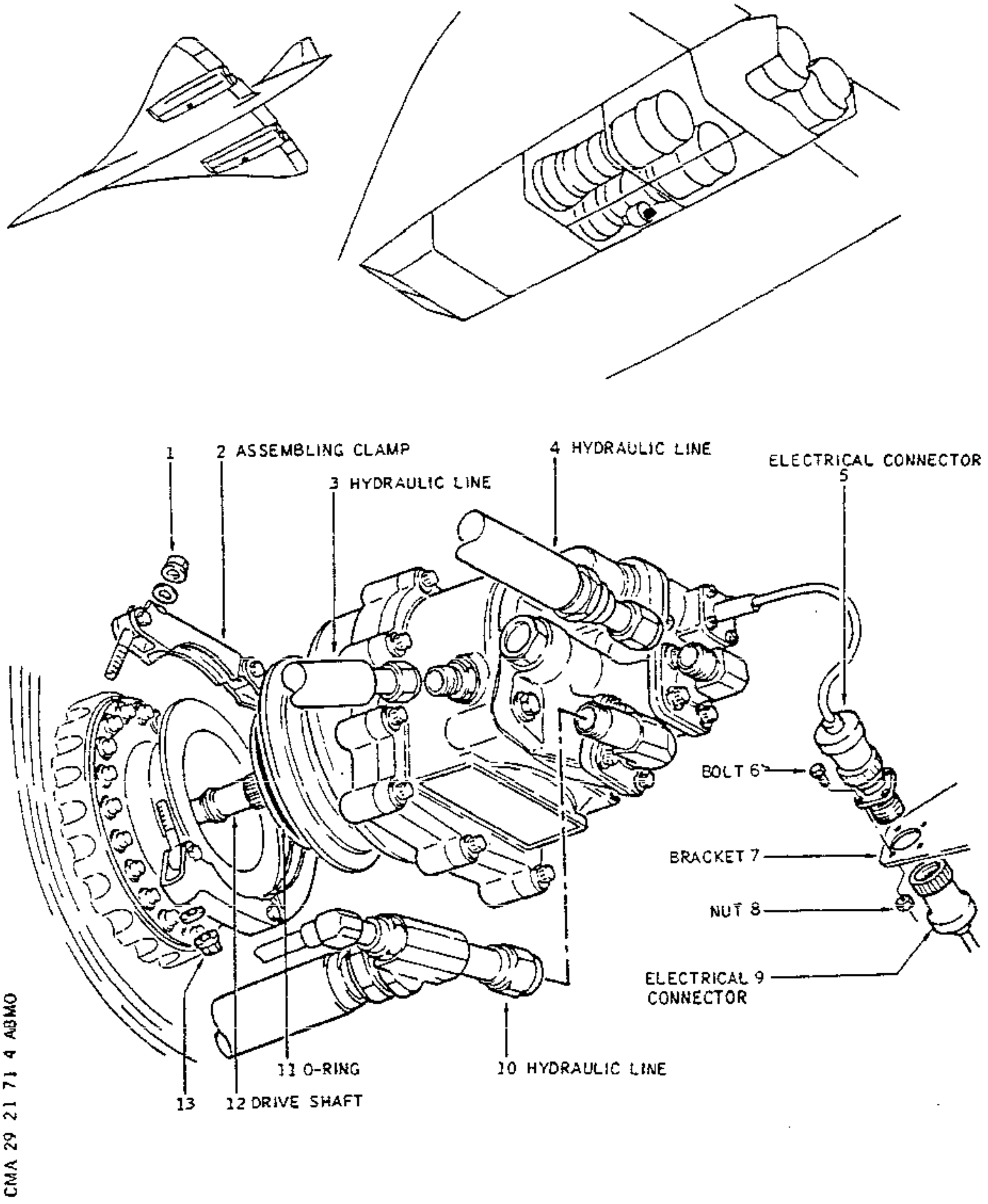
**ON A/C 001-005,

R (1) Disconnect lines (3), (4) and (10) from pump. Cap
R ends of lines and of pump unions.

** ON A/C 006-007,

(1) Cut and remove lockwire, disconnect lines (3), (4) and (10) from pump. Cap open ends of lines and of pump unions.

PRINTED IN ENGLAND



R

Engine-Driven Hydraulic Pump
Figure 401

(2) Disconnect electrical connector.

(a) Cut and remove lockwire, disconnect electrical connector (9).

(b) Remove nuts (8) and bolts (6).

(c) Remove electrical connector (5) from bracket (7).

(3) Remove nuts (1) and (13), support pump and remove assembling clamp (2).

(4) Remove pump horizontally, so as not to damage splines of drive shaft (8).

(5) Retain assembling clamp (2) and check its condition.

PRINTED IN ENGLAND

D. Preparation of Replacement Component

RB (1) If no contamination is suspected change case drain filter element. Refer to 29-00-00, General Servicing, para. 3, Filter Elements.

RB (2) If contamination is suspected carry out flush. Change pressure, case drain and low pressure filter elements. Refer to 29-00-00, General Servicing, paras. 2 and 3, Filter Elements.

E. Install

(1) Check pump O-ring (11) for correct condition, replace if necessary and lubricate with Product No.118.

(2) Install pump, ensuring correct position on drive shaft (12) and on mounting plate guide pin.

(3) Install assembling clamp:

(a) Make certain that tapered surfaces, threads of nuts and bolts and mating surfaces of nuts, washers and spherical seatings are perfectly clean. Then apply a thin film of engine oil to the sur-

faces, enough to cover them. Wipe off any excess.

(b) Install assembling clamp (2) on flange, with spring washers under the nuts.

(c) Check rundown torque of nuts. It should be between 6 and 20 lbf.in. (0.065 and 0.457 m.daN)

(d) Tighten inner nut (1). Torque to between 55 and 60 lbf.in. (0.62 and 0.68 m.daN). Using a leather mallet or fibre drift, tap each segment in turn to ensure even seating of the clamp.

(e) Re-torque inner nut (1) only, to 55-60 lbf.in. (0.62-0.68 m.daN) and again tap each segment in turn.

(f) Proceed with final torque tightening of inner nut (1) to between 55 and 60 lbf.in. (0.62 and 0.68 m.daN)

(g) Proceed with final torque tightening of outer nut (13) to between 55 and 60 lbf.in. (0.62 and 0.68 m.daN).

<u>WARNING</u> : WHEN THESE OPERATIONS HAVE BEEN CARRIED OUT THE TORQUE LOAD ON THE INNER NUT WILL HAVE BEEN REDUCED. DO NOT RE-TIGHTEN.

**ON A/C 001-005,

(4) Connect hydraulic lines (3), (4) and (10) to pump. Torque as follows :

Line (3) : 100-120 lbf.in. (1.12-2.8 m.daN)
Line (4) : 300-480 lbf.in. (3.36-5.37 m.daN)
Line (10) : 450-500 lbf.in. (5.084-5.649 m.daN)

R ** ON A/C 006-007,

(4) Connect hydraulic lines (3), (4) and (10) to pump. Torque as follows :

Line (3) : 100-120 lbf. in. (1.72-2.80 m.daN)
Line (4) : 300-480 lbf. in. (3.36-5.37 m.daN)
Line (10) : 450-500 lbf. in. (5.084-5.649 m.daN)
Wirelock (Ref. 20-21-13).

R
R
R

R

(5) Connect electrical connector

(a) Fit electrical connector (5) in bracket (7)

(b) Install and tighten bolts (6) and nuts (8)

(c) Connect electrical connector (9) to connector (5)

(d) Wirelock (Ref. 20-21-13).

B NOTE : Refer to MM Chap. 71-50-00
B Removal/Installation for connector tighte-
B ning procedure.

(6) Remove safety clips and tags and reset circuit breakers tripped in preparation procedure.

(7) On Flight Engineer's HYDRAULIC MANAGEMENT panel, place control switch of installed pump in ON position. Check that SHUT OFF VALVES and PUMPS magnetic indicators located on same panel display OPEN and ON respectively.

(8) Bleed pump suction line (Ref. 29-21-00, Servicing).

(9) Replenish hydraulic tank as required (Ref. 12-12-29).

(10) De-energize aircraft electrical network and disconnect electrical ground power unit.

F. Tests

(1) Check operation of pumps during ground running or motoring of associated engine (Ref. 71-00-00, Adjustment/Test). During ground running or motoring procedures :

(a) Make certain that Yellow system pressure increases to rated value of 4000 psi (275 bars).

(b) Press pump L/PRESS caption light on Flight Engineer's HYDRAULIC MANAGEMENT panel. The pressure must drop, thus indicating that pump depres-

surization solenoid is operating correctly.

(2) After engine ground running or motoring procedures, check installation for leakage.

G. Close-Up

(1) Clean the area adjacent to the pump and make certain that no trace of hydraulic fluid remains.

(2) Make certain that working area is clear of tools and miscellaneous items of equipment.

(3) Close access panels and doors.

(4) Remove access platform.

Printed in England

3. Shaft - Drive

A. Equipment and Materials

DESCRIPTION	PART NO.
Special Materials (Ref. 20-30-00, No.118)	
Oil (Ref. 20-30-00, No.021)	
Extractor - Quill Drive Shaft	E925099000

B. Prepare

(1) Remove engine-driven hydraulic pump (Ref. paragraph 2)

R
R

R

C. Remove
R (Ref. Fig. 402)

(1) Remove circlip (1)

(2) Remove drive shaft (2) using extractor E925099000.

NOTE : The extractor may also be used for removing a broken drive shaft.

D. Preparation of Replacement Component

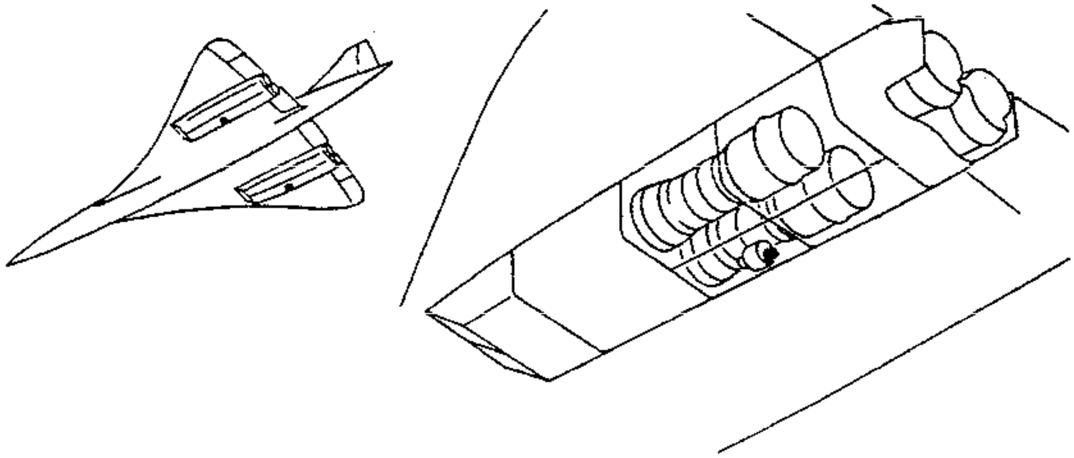
(1) Lubricate O-ring (3) with Product No.118.

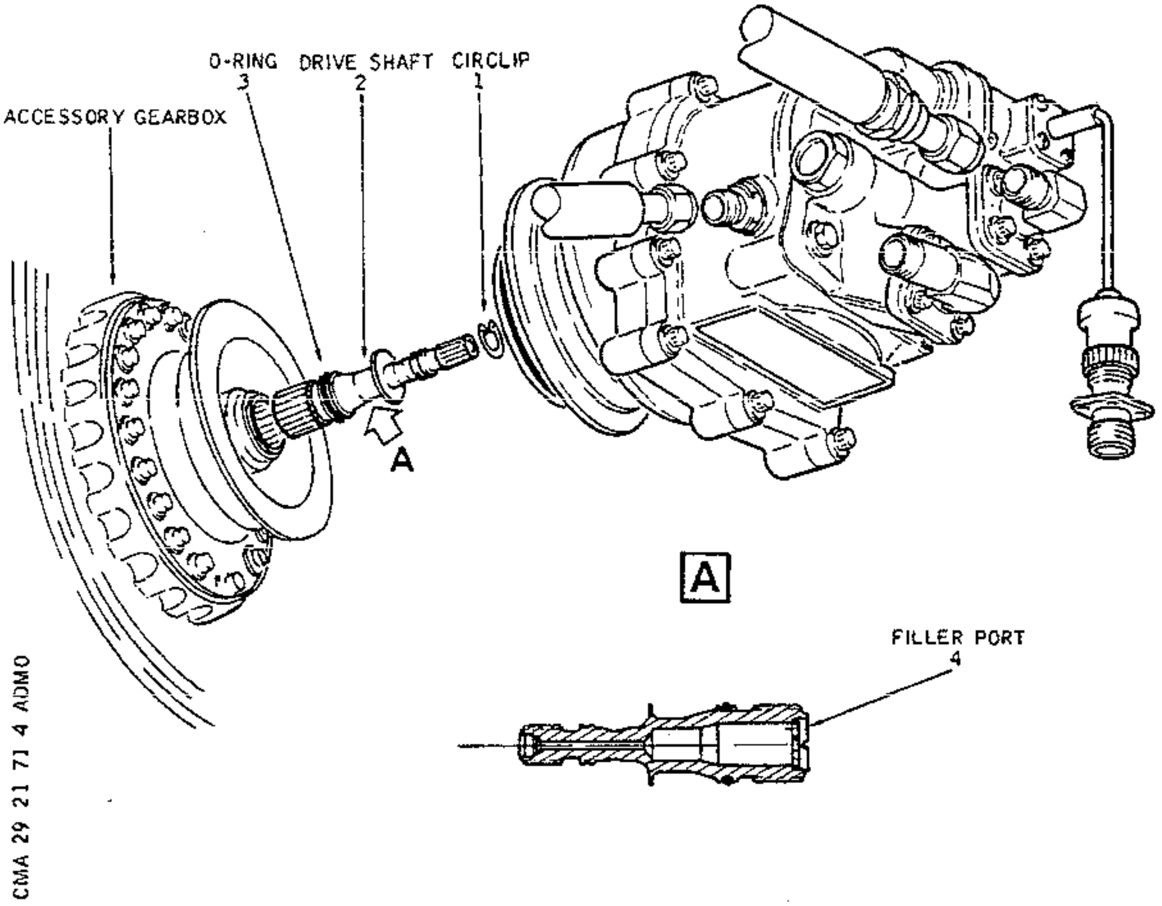
(2) Hold drive shaft horizontally so that filler port (4) is on uppermost side of shaft.

(3) Fill shaft to overflowing with Product No.021. Also lubricate outside of shaft with Product No.021.

E. Install

(1) Install shaft in housing on accessory gearbox, maintaining filler valve uppermost.





Pump Drive Shaft
Figure 402

R

(2) Install circlip (1).

(3) Install engine-driven pump (Ref paragraph 2).

F. Test

Proceed with test described in engine-driven pump removal/ installation procedure.

G. Close-Up

The close-up steps are those for the engine-driven pump removal/installation procedure.

B 4. Off-Load Solenoid Replacement

B A. Prepare

B
B (1) Proceed with preparation detailed in engine-driven
B pump removal/installation procedure (Ref. para. 2.B.).

B B. Remove

B (1) Disconnect electrical connector (5).

B (2) Remove two Allen headed bolts securing solenoid to
B pump and discard.

B (3) Remove solenoid and cable assembly.

B C. Preparation of Replacement Component

B (1) Install seals.

B (2) Lubricate with clean Hydraulic oil (Ref. 20-30-00,
B Product No.11).

B D. Install

B (1) Secure solenoid to pump with two new Allen headed
B bolts.

B (2) Torque tighten bolts to between 5.7 and 6.8 Nm (50 and
B 60 lbf in).

B (3) Reconnect connector (5).

B (4) Wire lock Allen headed bolts.

B E. Test

B (1) Proceed with test detailed in engine-driven pump
B Removal/Installation procedure (Ref. para.2.F.).

B F. Close-Up

B (1) The close-up steps are those for the engine-driven
B pump Removal/Installation procedure (Ref. para. 2.G.).

PRINTED IN ENGLAND

LOW PRESSURE SWITCH - REMOVAL/INSTALLATION

1. General

A pressure switch is mounted on the delivery line of each engine-driven hydraulic pump to indicate any low pressure condition which may occur in the pump. The pressure switches are located in the wing between spars 64 and 65 :

- Between ribs 18 and 19 on LH wing for engine 2 pump pressure switch (0324).
- Between ribs 15 and 16 on RH wing for engine 4 pump pressure switch (0323).

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform, 14 ft. 7 in. (4.440 m)	
Wing Protective Mat	
Electrical Ground Power Unit	

B. Prepare

(1) Open access door 153BB under fuselage and depressurize Yellow system tank (Ref. 29-13-00, Servicing).

(2) Open access door 151DB under fuselage and depressurize Yellow system (Ref. 29-11-00, Servicing).

(3) Trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
ENG 2 YELLOW PUMP CONT IND	15-215	M 311	B 8
ENG 4 YELLOW PUMP CONT IND		M 312	B 9

(4) Connect electrical ground power unit (Ref. 24-41-00, Servicing).

(5) Position wing protective mat.

(6) Open access doors to pressure switches :

- Access door 531AT for engine 2 pump pressure switch,
- Access door 632AT for engine 4 pump pressure switch.

WARNING : DISPLAY WARNING NOTICES ON ENGINE 2 PROHIBITING PRESSURIZATION OF YELLOW HYDRAULIC SYSTEM BY HYDRAULIC GROUND POWER UNIT.
DISPLAY A WARNING NOTICE AT FLIGHT ENGINEER'S STATION PROHIBITING USE OF GROUND PRESSURIZING SYSTEM ELECTRIC PUMPS.

C. Remove

(1) Disconnect electrical connector (1).

(2) Remove attaching screw and remove clamp (2).

(3) Engine 2 pump low pressure switch (0324) :
- Remove pressure switch from elbow (4).
Engine 4 pump low pressure switch (0323) :
- Unscrew coupling nut (3) and remove pressure switch.

(4) Cap open line ends and plug ports.

D. Install

(1) Remove blanking caps and plugs.

(2) Engine 2 pump low pressure switch (0324) :
- Check that O-ring (5) is installed and in correct condition.
- Install pressure switch on elbow (4) and tighten, taking care not to damage O-ring (5).

Engine 4 pump low pressure switch (0323) :
- Position pressure switch, install and tighten coupling nut (3).

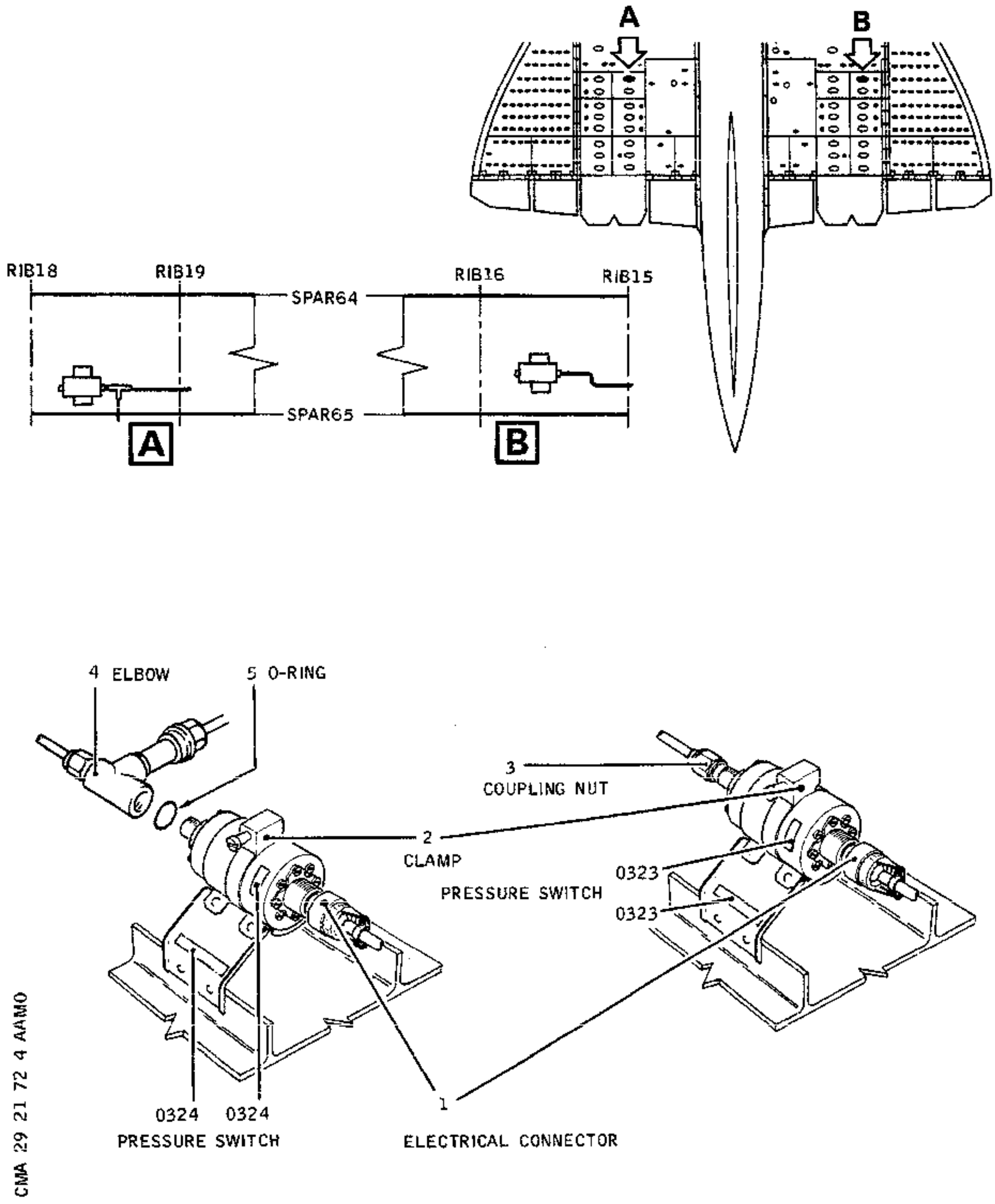
(3) Pressurize hydraulic tanks (Ref. 29-13-00, Servicing).

(4) Slightly loosen coupling nut (3) on pressure switch, to bleed line of any air.
Tighten coupling nut (3).

(5) Clean coupling nut and adjacent area, and make certain that no trace of hydraulic fluid remains.

(6) Install clamp (2) and tighten attaching screw.

(7) Connect electrical connector (1).



Low Pressure Switch Installation
Figure 401

E. Tests

(1) Energize aircraft electrical network (Ref. 24-41-00, Servicing).

(2) Remove safety clips and tags and reset the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
ENG 2 YELLOW PUMP CONT IND	15-215	M 311	B 8
ENG 4 YELLOW PUMP CONT IND		M 312	B 9

(3) On Flight Engineer's HYDRAULIC MANAGEMENT panel, engine-driven pump L/PRESS warning lights must come on

(4) Test pressure switch operation.

(a) Engine 2 pump low pressure switch (0324).

(a1) Pressurize Yellow hydraulic system (Ref. 29-21-00, Servicing, Yellow System Pressurization Using Hydraulic Ground Power Unit)
- On Flight Engineer's HYDRAULIC MANAGEMENT panel, L/PRESS-2 - YELLOW warning light must go off when pressure increases to 140 +50/-10 bars (2030 +720/-145 psi)

(a2) Shut down hydraulic ground power unit
- L/PRESS-2 - YELLOW warning light must come on when pressure decreases to 140 +10/-25 bars (2030 +145/-290 psi).

(a3) Disconnect and remove hydraulic ground power unit (Ref. 29-21-00, Servicing).

(b) Engine 4 pump low pressure switch (0323). Check this pressure switch during run-up or cranking of Engine 4 (Ref. 71-00-00, Adjustment/Test) During run-up or cranking of this engine :

(b1) On Flight Engineer's HYDRAULIC MANAGEMENT panel, L/PRESS- 4 - YELLOW warning light must go off when pressure increases to 140 +50/-10 bars (2030 +720/-145 psi).

(b2) At end of run-up or cranking, L/PRESS-4 - YELLOW warning light must come on when pres-

sure decreases to 140 +10/-25 bars (2030 +145/-290 psi).

(5) De-energize the aircraft electrical network and disconnect electrical ground power unit (Ref. 24-41-00, Servicing).

(6) Check pressure switches for leakage after tests.

F. Close-Up

(1) Disconnect and remove electrical ground power unit (Ref. 24-41-00, Servicing).

(2) Close access doors 153BB, 151DB, 531AT or 632AT.

(3) Remove wing protective mat.

(4) Remove warning notices.

(5) Remove access platform.

ENGINE-DRIVEN PUMP DELIVERY FILTERS - REMOVAL/INSTALLATION

WARNING : OBSERVE THE ELECTRICAL SAFETY PRECAUTIONS DETAILED IN 24-00-00, SERVICING.

AN AIR INTAKE MUST NOT BE WORKED ON UNTIL THE SPILL DOORS AND RAMPS OF ALL INTAKES HAVE BEEN ELECTRICALLY AND HYDRAULICALLY ISOLATED, AS FOLLOWS :

(1) LOCKING PINS MUST BE INSTALLED IN THE SPILL DOOR HYDRAULIC SELECTOR VALVES (TWO VALVES FOR EACH INTAKE).

(2) ALL APPROPRIATE CIRCUIT BREAKERS MUST BE TRIPPED AND SAFETIED.

(3) THE ANTI-INTERFERENCE PLATE MUST BE INSTALLED OVER THE "AIR INTAKES" MANAGEMENT PANEL.

1. General

The removal/installation procedure described in this topic applies to both Yellow system engine-driven pump delivery filters (3325 and 4026).

2. Engine-Driven Pump Delivery Filter

A. Equipment and Materials

DESCRIPTION	PART NO.
Locking Pins - Spill Door Selectors - Bay Nos. 2 and 4	E925037000
Locking Pins - Spill Door Selectors - Bay Nos. 1 and 3	E925038000
Special Materials (Ref. 20-30-00, No.109)	
Anti-Interference Plate - Air Intake Management Panel	E925068000
Access Platform, 5 ft. 11 in. (1.80 m)	
Container for Recovery of Hydraulic Fluid	
Blanking Plugs/Caps (for Hydraulic	

DESCRIPTION	PART NO.
Lines, Filter and Selector Valve)	
Warning Notices	
Circuit Breaker Safety Clips	

B. Prepare

(1) Open access door 153BB and depressurize Yellow system tank (Ref. 29-13-00, Servicing).

(2) Open access door 151DB and depressurize Green, Blue and Yellow hydraulic systems (Ref. 29-11-00, 29-12-00, 29-21-00, Servicing).

WARNING : DISPLAY WARNING NOTICES ON ENGINES 1, 2 AND 3 PROHIBITING PRESSURIZATION OF BLUE, GREEN AND YELLOW HYDRAULIC SYSTEMS BY HYDRAULIC GROUND POWER UNIT.

DISPLAY A WARNING NOTICE AT FLIGHT ENGINEER'S STATION PROHIBITING USE OF GROUND PRESSURIZING SYSTEM ELECTRIC PUMPS.

DISPLAY A WARNING NOTICE ON THE ENGINE START PANEL AT THE FLIGHT ENGINEER'S STATION PROHIBITING ENGINE STARTING.

POSITION SAFETY BARRIERS TO PREVENT ACCESS TO AIR INTAKE SPILL DOOR TRAVEL RANGE.

(3) Install anti-interference plate E925068000 over Flight Engineer's AIR INTAKES management panel.

(4) Install locking pins E925037000 and E925038000 (Ref. 71-62-00, Servicing).

(5) Trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
Engine 2			
INT 2 MAIN HYD SUP	15-215	2K1950	B18

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
INT 2 ST'BY HYD SUP	1-213	2K1960	E 9
AICU 2A SUP	13-216	2K2050	A 3
AICU 2B SUP	2-213	2K2051	H14
Engine 4			
INT 4 MAIN HYD SUP	15-216	4K1950	A 8
INT 4 ST'BY HYD SUP	5-213	4K1960	A 6
AICU 4A SUP	14-216	4K2050	B 5
AICU 4B SUP	2-213	4K2051	B14
Engines 1, 2, 3 and 4			
HYD GRND CHECK OUT SEL VALVE CONT	15-216	M 626	F22
HYD TANK COMPR CONT	15-215	M 602	D 8

(6) Open access doors 421JR and 421HR for filter 3325 and 441JR and 441HR for filter 4026.

C. Remove

(1) Disconnect rigid lines (17) from filter (13) and from hoses (14), loosen nut securing line to clamp block (15). Remove ligatures (16) and remove rigid lines (17). Plug/cap open ports and line ends.

(2) Disconnect electrical connector from selector valve (12).

R (3) Remove cotter pins, remove nuts (1).

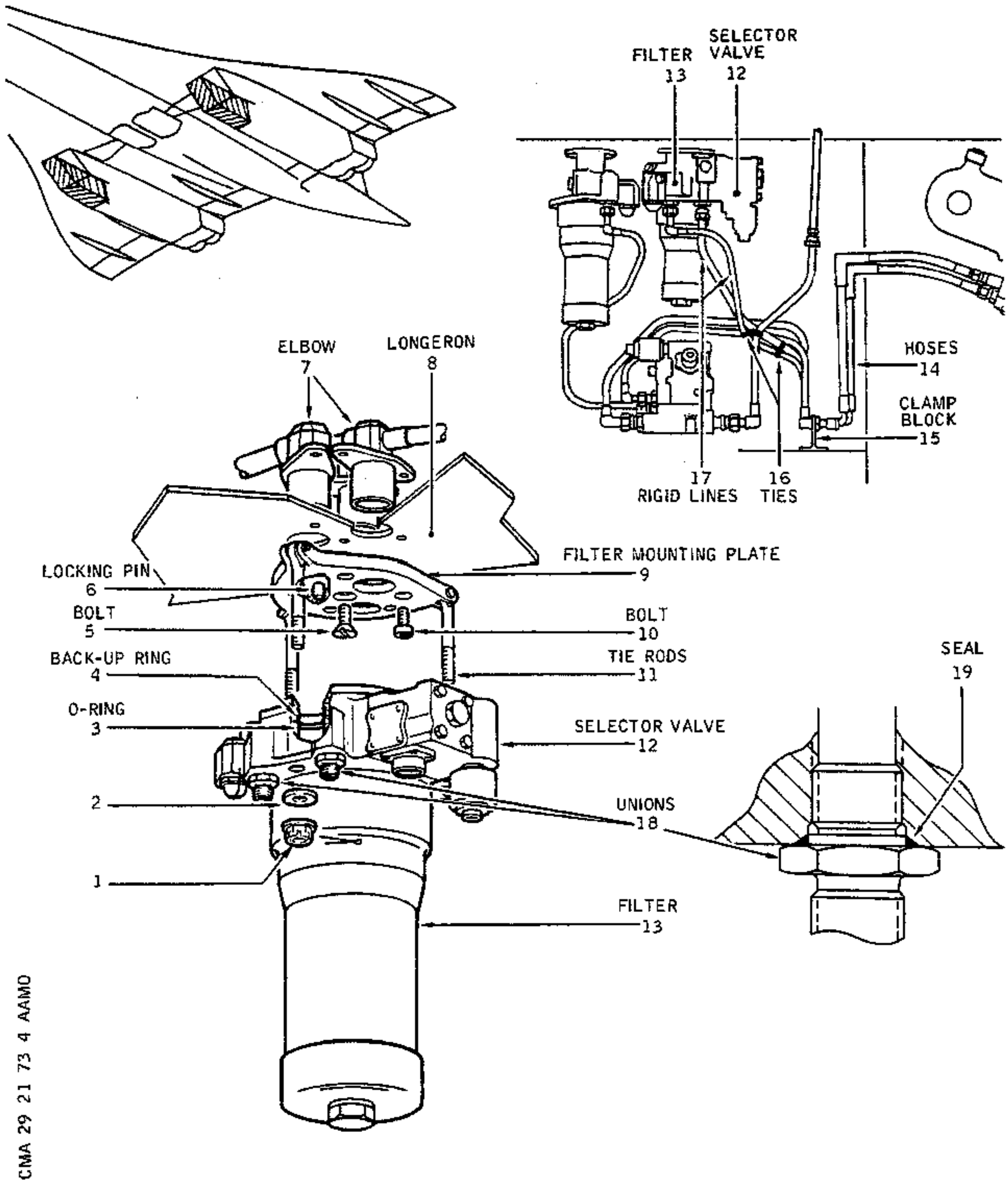
(4) Remove filter (13) (pull downwards to disengage). Plug open ports.

(5) Remove bolts (10).

(6) Remove bolt (5).

(7) Remove filter mounting plate (9).

(8) Disassemble selector valve (12) from filter (13)



Engine-Driven Pump Delivery Filter
Figure 401

R

(Ref. 71-62-12, Removal/Installation).

D. Preparation of Replacement Component

(1) Remove and discard O-rings (3), replace with new O-rings. Back-up rings (4) must be installed on top of O-rings (3), as shown in illustration.

(2) Assemble selector valve (12) to filter (13). (Ref. 71-62-12, Removal/Installation).

(3) Remove unions (18) from removed filter, replace seals (19), and install unions (18) on replacement filter.

E. Install

(1) Install filter mounting plate (9) on longeron (8). Check that locating pin (6) is engaged in associated recess on longeron (8). Attach mounting plate (9) to longeron (8) with bolt (5).

(2) Install bolts (10) to attach elbows (7) to filter mounting plate (9). Torque to between 75 and 80 lbf.in. (0.847 and 0.903 m.daN).

NOTE : Bolts (10) shall be coated with product No.109 prior to installation.

**ON A/C 001-001,

(3) Remove blanking plugs, position and install filter (13) on filter mounting plate (9). Install nuts (1) on tie rods (11) and torque to between 120 and 130 lbf.in. (1.355 and 1.468 m.daN). Safety with a cotter pin.

R **ON A/C 002-007,

(3) Remove blanking plugs, position and install filter (13) on filter mounting plate (9). Install washer (2). Install nuts (1) on tie rods (11) and torque to between 120 and 140 lbf.in. (1.355 and 1.581 m.daN). Safety with a cotter pin (1).

(4) Remove blanking plugs/caps and connect rigid lines (17) to filter and to hoses. Lower elbow shall be placed in clamp block (15). Tighten nut to secure elbow on clamp block (15).
Torque value for hoses :
Yellow return - 215 to 240 lbf.in. (2.429 to 2.711 m.daN)
Yellow delivery - 135 to 145 lbf.in. (1.525 to 1.638

R m.daN).

R After SB 71-010 For A/C 001-005,

R (4) Remove blanking plugs/caps and connect rigid lines
R (17) to filter and to hoses. Lower elbow shall be
R placed in clamp block (15). Tighten nut to secure elbow
R to clamp block (15).
R Torque value for hoses :
R Yellow return - 215 to 240 lbf.in. (2.429 to 2.711
R m.daN)
R Yellow delivery - 215 to 240 lbf.in. (2.429 to
R 2.711 m.daN).

(5) Connect electrical connector to selector valve (12).

R (6) Install ligatures (16) (Ref. 20-23-14).

(7) Clean filter and adjacent area. Make certain that no trace of hydraulic fluid remains.

(8) Remove warning notices.

F. Tests

(1) Test selector valves (Ref. 71-62-12, Adjustment/Test).

(2) Filter (4026) on engine 4 can only be checked for leakage after engine has been ground run at full power, or motored (Ref. 71-00-00, Adjustment/Test).

(3) To check filter (3325) on engine 2, pressurize Yellow hydraulic system, using a hydraulic ground power unit (Ref. 29-21-00, Servicing).

G. Close-Up

(1) Replenish hydraulic tank as required (Ref. 12-12-29).

(2) Remove locking pins E925037000 and E925038000 (Ref. 71-62-00, Servicing).

(3) Remove anti-interference plate E925068000.

(4) Remove safety clips and reset circuit breakers.

(5) Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(6) Close access doors 151DB, 153BB, 421JR and 421HR, or 441JR and 441HR.

(7) Remove access platform.

1. General

The ground pressurizing system is used for ground operations requiring hydraulic power when the engines are shut down.

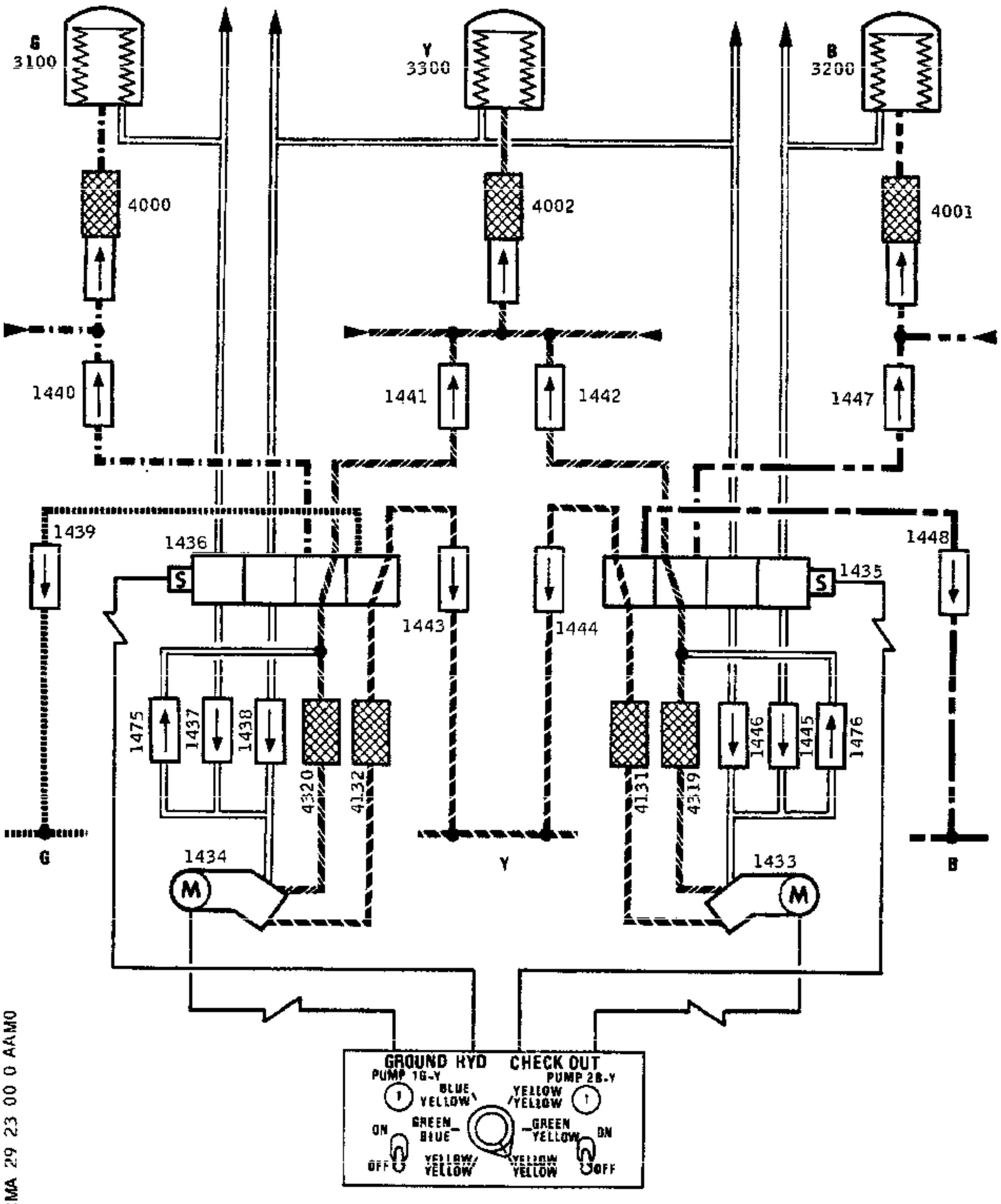
It enables the three hydraulic systems in the aircraft to be pressurized, either separately or simultaneously, two at a time.

2. Description (Ref. Fig. 001)

The ground pressurizing system comprises the following components :

- Two self-regulating electric pumps (1434) and (1433).
- Two solenoid-controlled electro-hydraulic selector valves (1436) and (1435).
- Four non-return valves on the pump suction lines (1437) (1438) (1446) (1445).
- Two non-return valves between the pump suction and case drain lines (1478) (1476).
- Four HP non-return valves (1439) (1443) (1444) (1448).
- Four LP non-return valves (1440) (1441) (1442) (1447).
- Two HP filters (4132) (4131).
- Two LP filters (4320) (4319).
- R A control panel at the Flight Engineer's station.

Printed in England



CMA 29 23 00 0 AAM0

Ground Pressurizing System - Schematic
Figure 001

R

3. Electric Pumps
(Ref. Fig. 002)

A. Description

Each pump is driven at 7700 r.p.m. by a 3-phase 115V 400Hz electric motor. It comprises a rotating cylinder barrel, integral with the drive shaft. The barrel houses nine pistons bearing against a swivel plate by means of shoes.

B. Operation

(1) The rotation of the barrel in relation to the swivel plate imparts a reciprocating motion to the pistons which draw in, and deliver hydraulic fluid.

(2) The tilt angle of the swivel plate is controlled, in one direction by a hydraulically slaved piston, and
R in the other by a return spring.

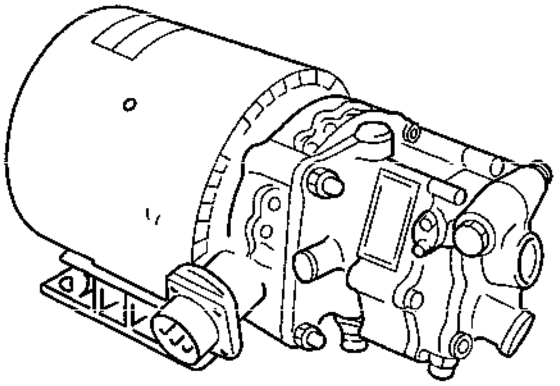
C. Regulation

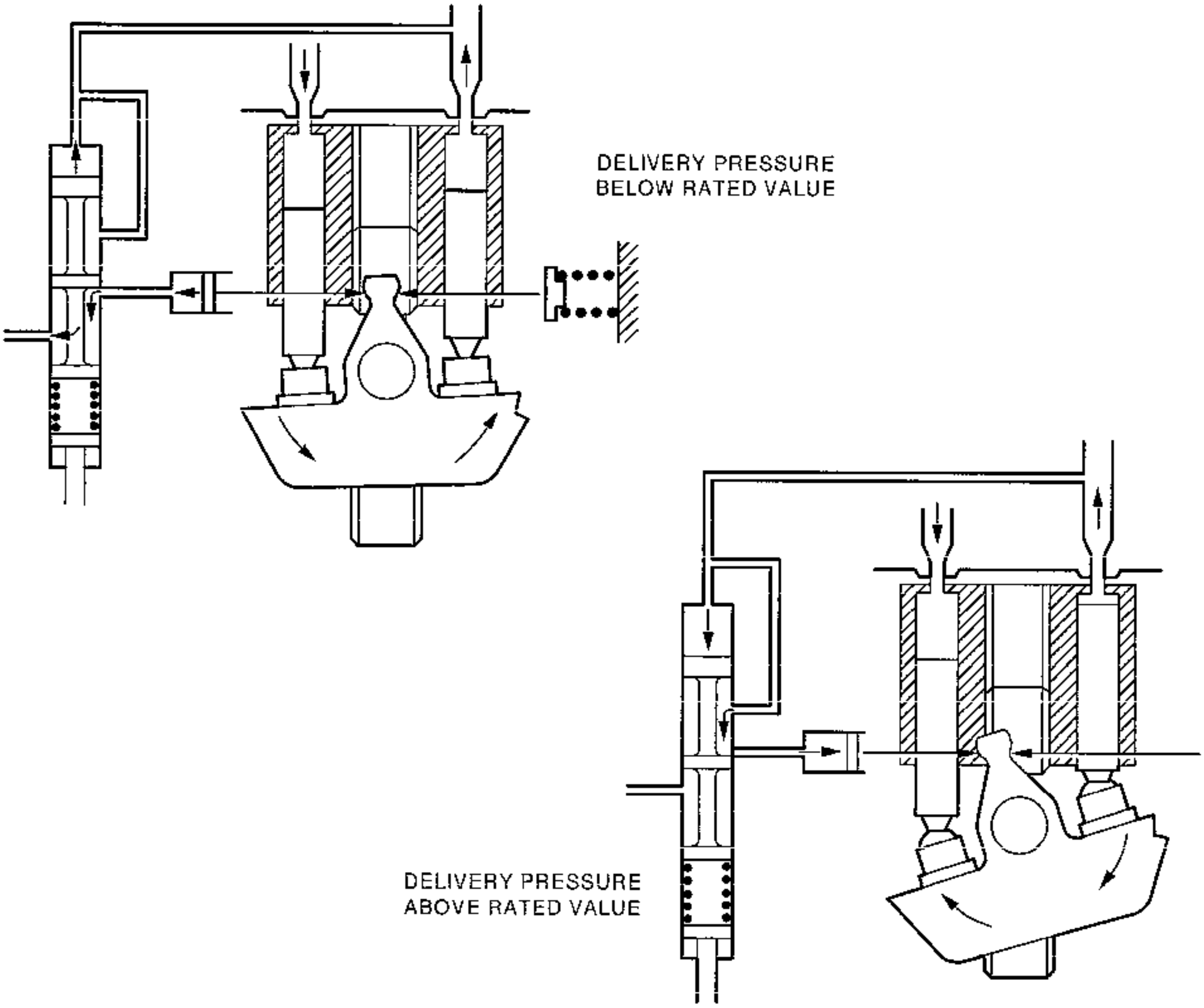
R Automatic pressure regulation is achieved by adjusting out-flow to demand, while maintaining a pressure of 240 bars (3453 p.s.i.)

R Delivery pressure acts against the slide of a pressure compensator valve by compressing a return spring,
R calibrated to balance the nominal pressure.

R When delivery pressure exceeds spring tension, compensator
R valve slide is displaced and pressure is admitted to the piston controlling the tilt angle of the swivel plate. The tilt angle is reduced, producing a consequent reduction in flow and with the result that delivery pressure is maintained at its nominal value.

When delivery pressure is below spring calibration the slide moves in the opposite direction releasing the fluid acting on the swivel plate actuator piston. The latter is then driven back into the "maximum stroke" position by the return spring.





PRINTED IN ENGLAND

CMB 29 23 00 0 ACM0 00

Hydraulic Pump Regulation
Figure 002

4. Electro-Hydraulic Selector Valves

A. Description (Ref. Fig. 003)

Each selector comprises :

(1) An upper and lower housing bolted together. The hydraulic lines are connected into the valves through bosses.

(2) Two main slide-valve/liner assemblies, in passages in the housing.

(3) The control head, containing :

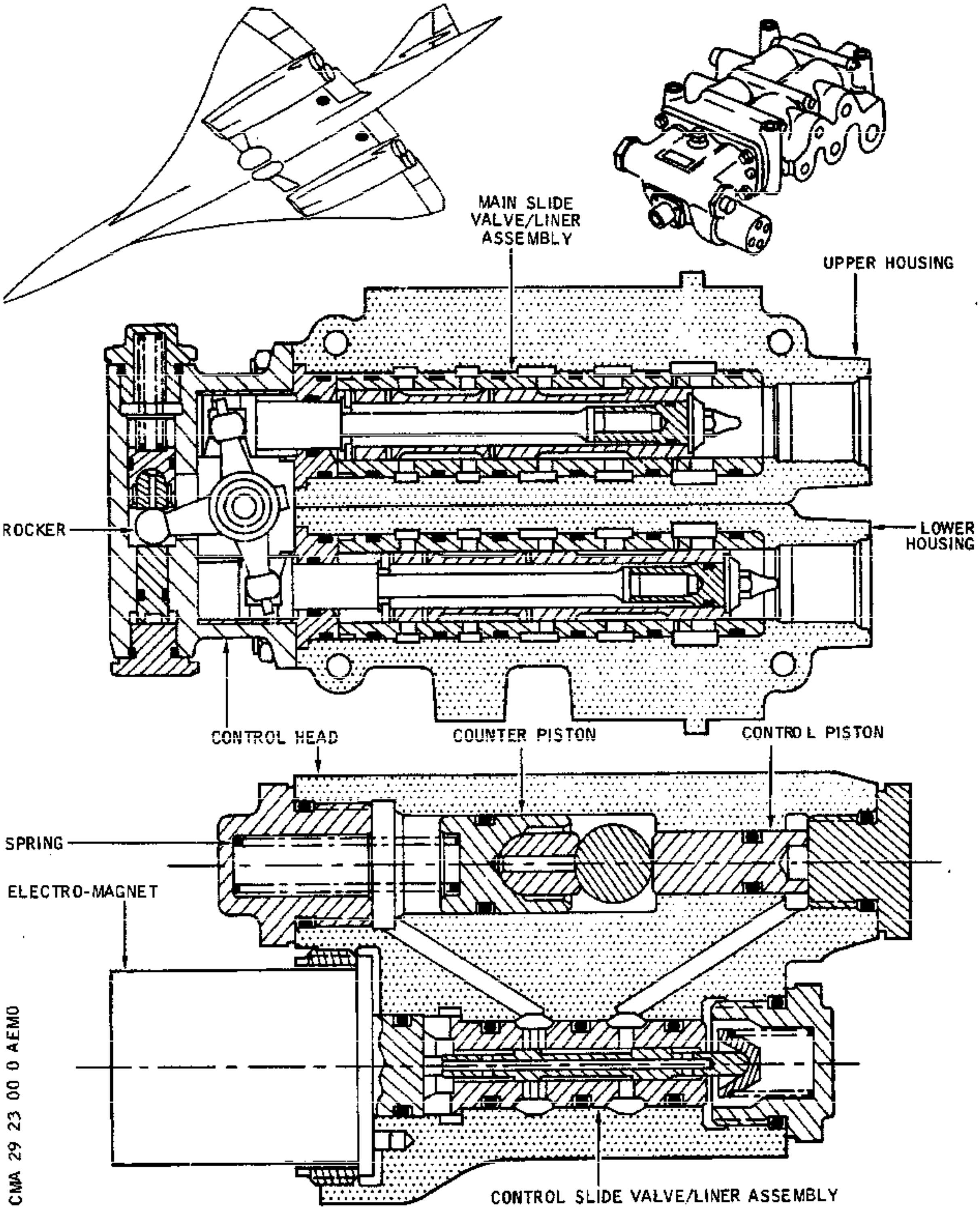
- A rocker, which simultaneously actuates the main slide valves
- The rocker control system, consisting of a control piston and spring-assisted counter piston.

A slide-valve/liner control assembly.

An electro-magnet which activates the control slide-valve.

B. Operation

When the Yellow system is pressurized, the electro-magnet is in the rest position.
When the electro-magnet is energized it drives the slide-valve control, which directs fluid pressure against the rocker control piston. The main slide-valves then take up a position allowing pressurization of either the Green system (selector 1436) or the Blue system (selector 1435).



Electro-Hydraulic Selector Valve
Figure 003

R

5. Filters

A. Description (Ref. Fig. 004)

The filter is composed of a head, a housing and a filter
R element. The head comprises :

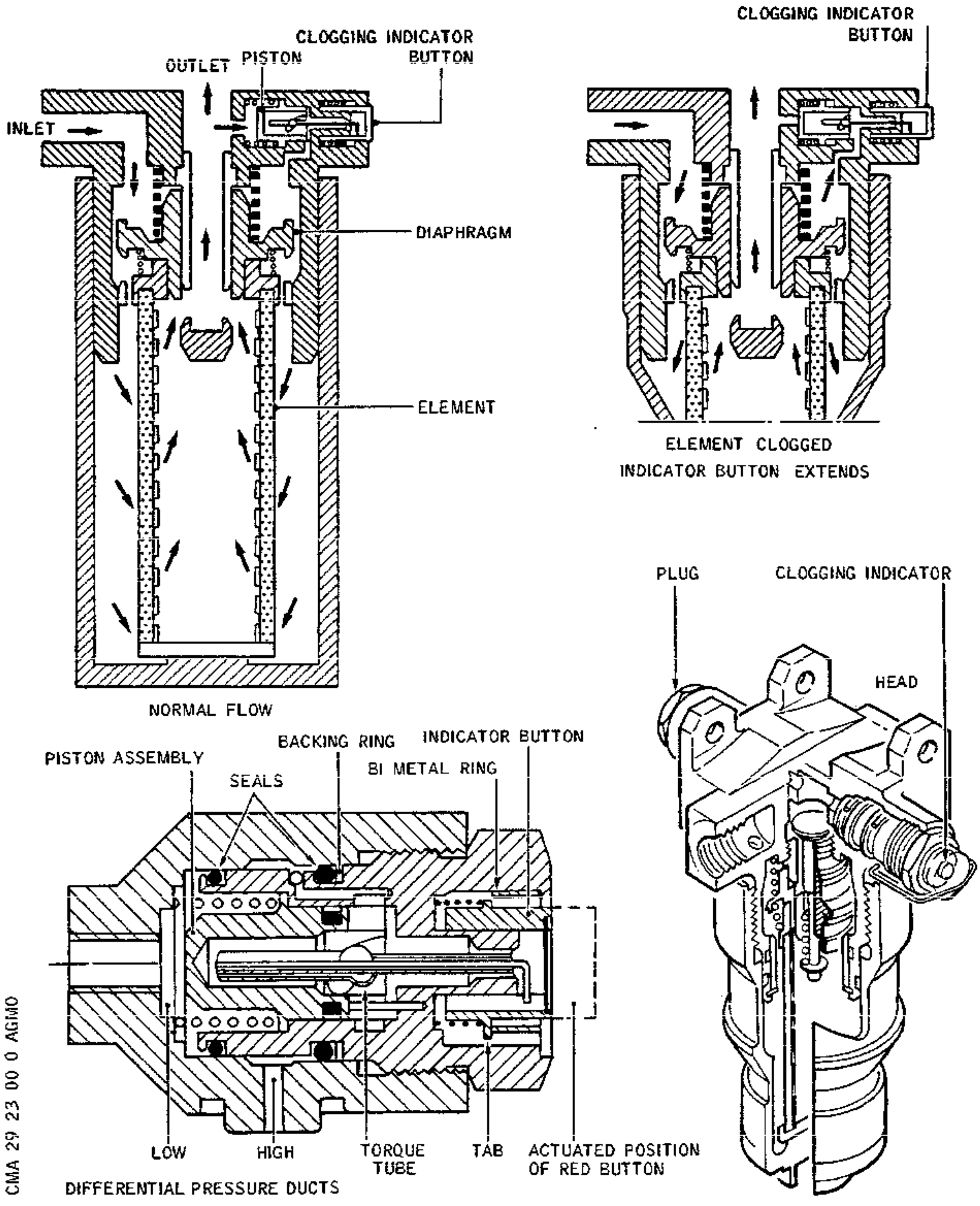
R - Threaded hydraulic fluid inlet and outlet bosses.
R - A self-sealing system, enabling the filter elements to be changed without loss of hydraulic fluid.
R - A clogging indicator.

R B. Clogging Indicator Operation

R When the filter element is clogged, differential pressure
R acts on the piston, which compresses the spring, and by
R means of a helicoidal track system, rotates an indicator
R button with an eccentric, cam-type tab.

R When the pressure differential reaches a preset value, the
R indicator button has rotated to a point where the second
R spring moves the tab into a bi-metal ring. The button then
R extends. However, the tab can only move into the ring at a
R given temperature, thus preventing untimely operation of
R the system at low temperatures.

R After replacement of the filter element, press the indica-
R tor button.



Filters - Principle of Operation
Figure 004

R

6. Operation (Ref. Fig. 001)

A. The electrical supply for the electric pumps is from the normal aircraft ground connection.

B. Operation of the selector valves, by means of the selector switch on the Flight Engineer's panel, enables:

(1) Pressurization of either the Green or Yellow system, by means of pump (1434).

(2) Pressurization of either Blue or Yellow system by means of pump (1433).

C. This arrangement allows simultaneous pressurization of the following hydraulic systems:

- Green and Blue, or
- Green and Yellow, or
- Blue and Yellow.

It also enables the two Yellow system pumps to be connected for operations requiring a substantial hydraulic power output. Whatever the selected combination of systems, each pump is supplied with fluid by the relevant hydraulic system tank.

7. Control Panel

(Ref. Fig. 005)

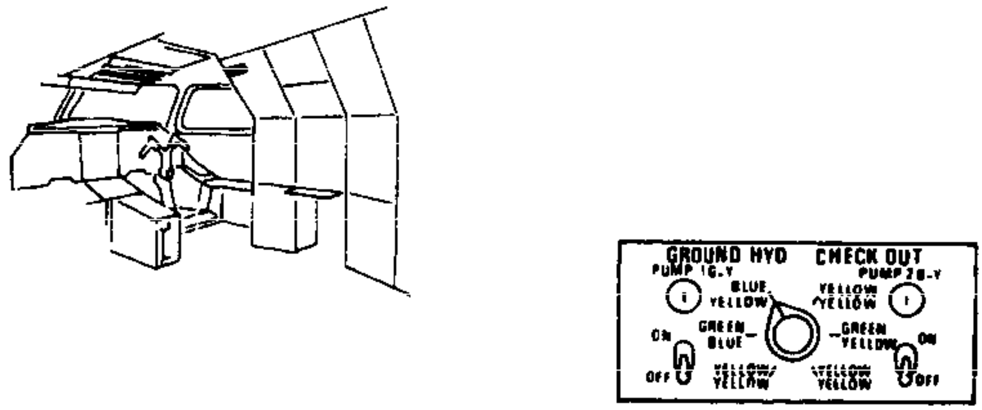
R A. Description (Ref. Fig.006)

(1) The ground pressurizing system is operated electrically from a panel at the Flight Engineer's station.

(2) The control panel comprises the following items:

- Two ON/OFF switches, which enable the pumps to be started or stopped by means of two contact switches
- Two circuit breakers, which protect the circuits
- A selector switch, which activates the selector valve

PRINTED IN ENGLAND

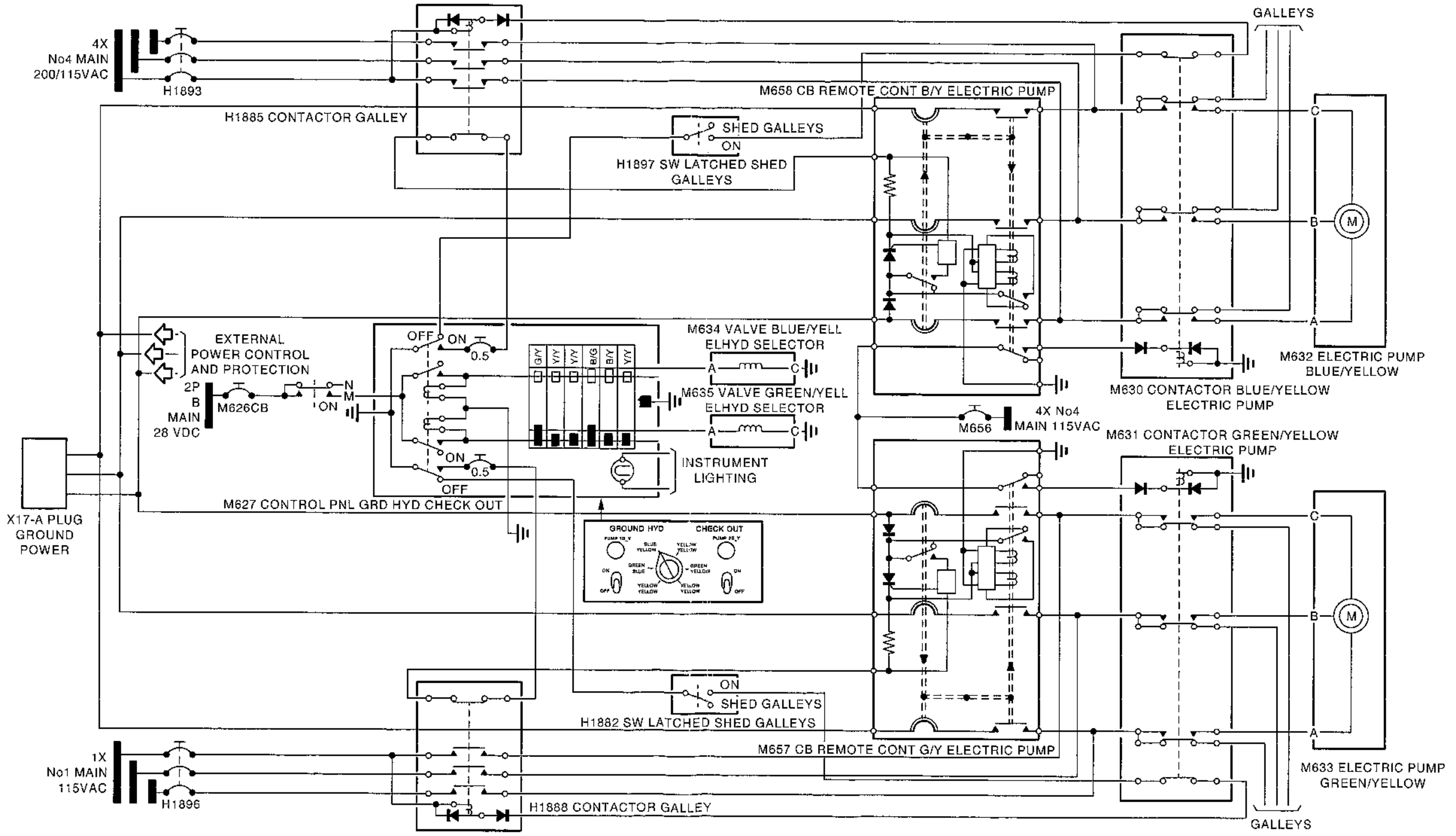


CMA 29 23 00 0 AJM0

Control Panel
Figure 005

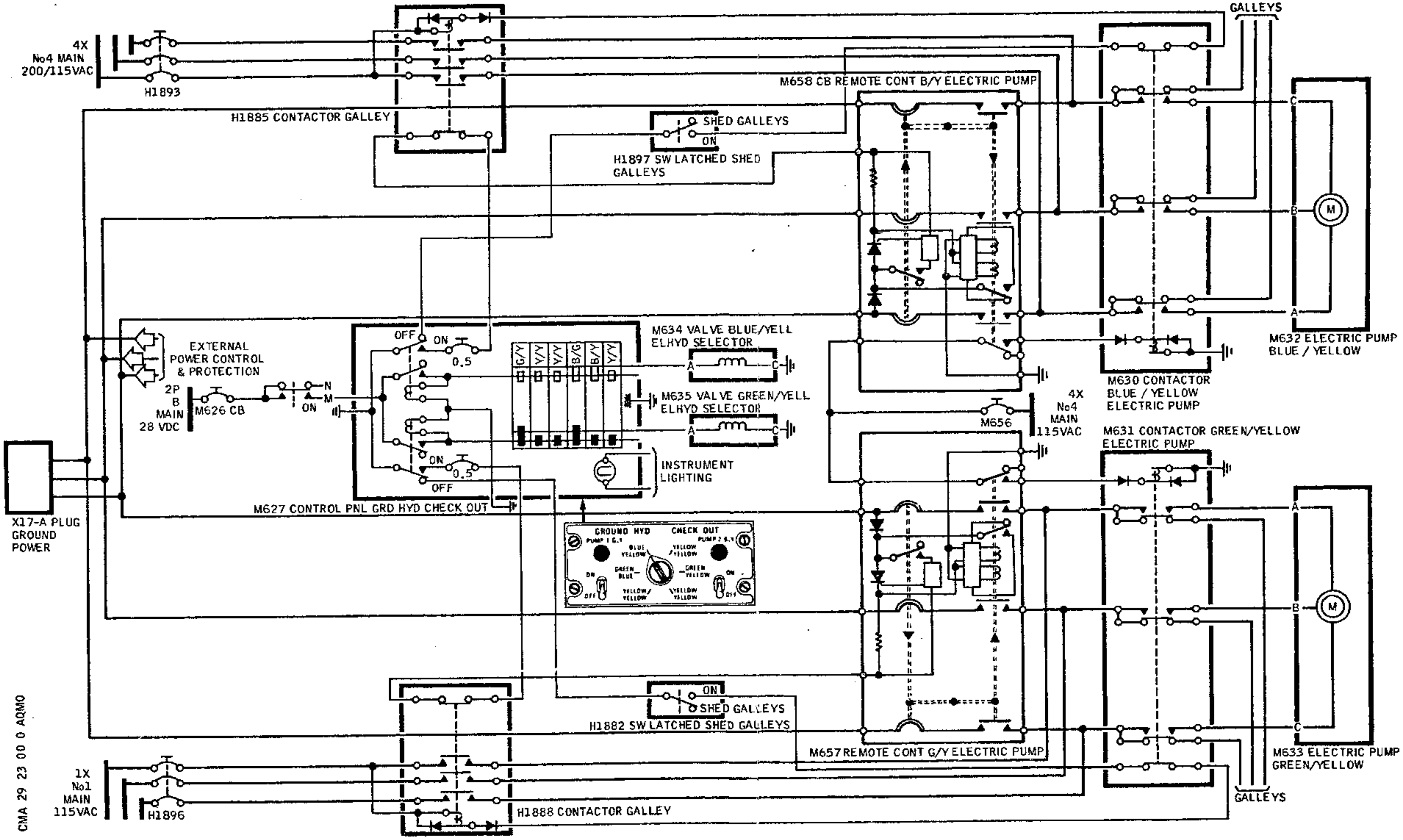
electro-magnets and enables the following systems to be pressurized :
- Green and Blue
- Green and Yellow
- Blue and Yellow
- Yellow (by simultaneous operation of both pumps).

(3) The electric power supply to the ground pressurization system and the galleys is provided by a single circuit from the electrical ground supply plug. The contact switches include auxiliary contacts which prevent power from being supplied simultaneously to the two services.



CMB 29 23 00 0 AQM0 00

R Electrical Schematic
Figure 006



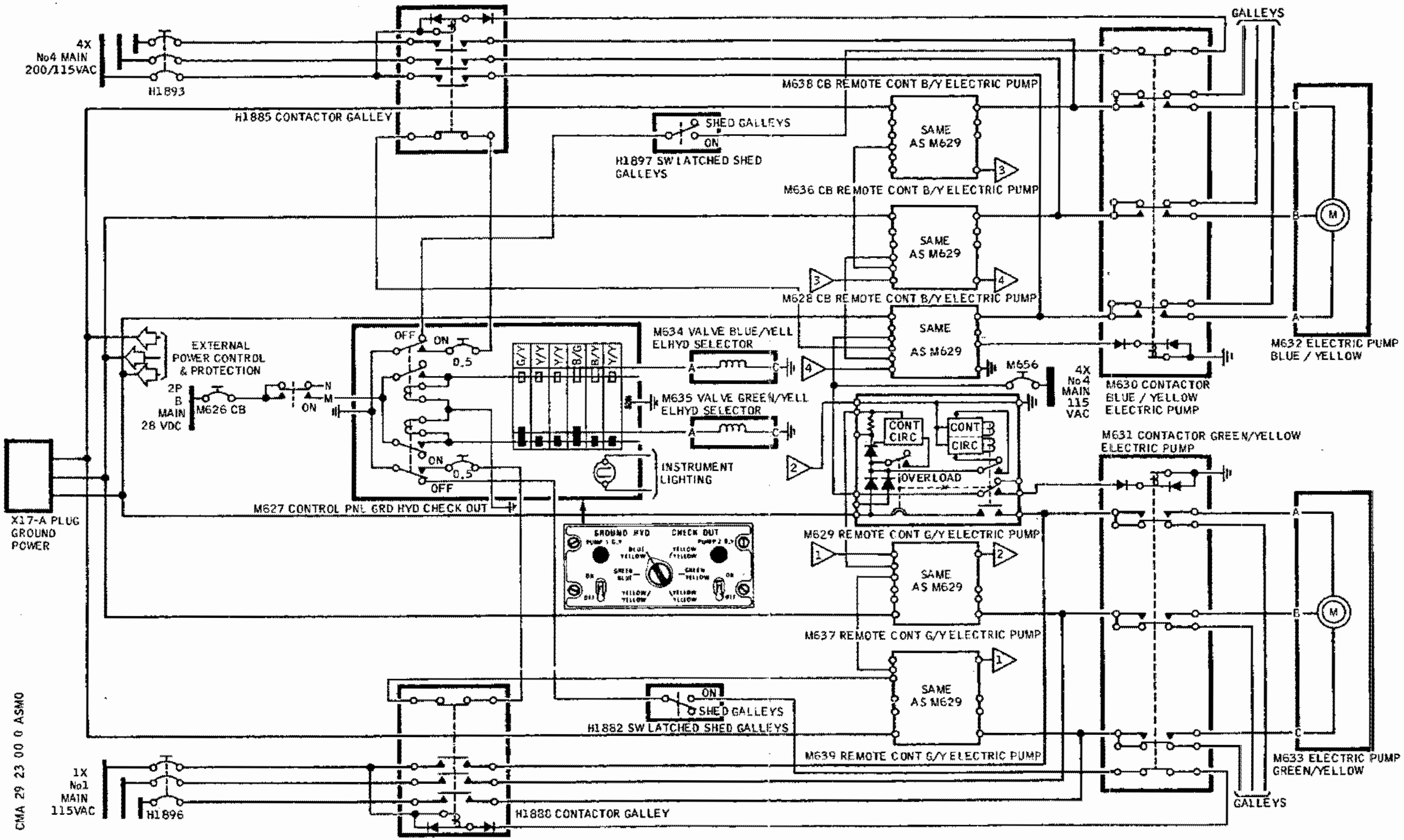
Electrical Schematic with Single - Phase RCC.B
Figure 007

R

R EFFECTIVITY: 001-005,

BA

Printed in England



R Electrical Schematic with Three - Phase RCC.B
Figure 008

GROUND PRESSURIZING SYSTEM - TROUBLE SHOOTING

WARNING : MAKE CERTAIN THAT THE POSITIONS OF NOSE AND MAIN GEAR DOORS CORRESPOND WITH THE ACTUAL POSITIONS OF THE RESPECTIVE OPERATING HANDLES.
HANDLE LOCKED, INDICATOR PLATE SHOWING WHITE : DOORS CLOSED.
HANDLE LOCKED, INDICATOR PLATE SHOWING RED : DOORS OPEN.

MAKE CERTAIN THAT THE LANDING GEAR POSITION INDICATED ON THE GEARS POSITION INDICATING UNIT CORRESPONDS WITH THE ACTUAL POSITION OF THE LANDING GEAR.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE, MAKE CERTAIN THAT THE TRAVEL RANGES OF THE CONTROL SURFACES ARE CLEAR.

BEFORE PRESSURIZING HYDRAULIC SYSTEMS, CHECK THAT ALL CONTROLS ARE SET TO CORRESPOND WITH THE ACTUAL POSITION OF THE SERVICES THEY OPERATE.

MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

OBSERVE THE ELECTRICAL SAFETY PRECAUTIONS DESCRIBED IN 24-00-00, SERVICING.

1. General

The following trouble shooting procedures are intended to enable faults found in the ground pressurizing system to be quickly rectified.

The defect can be isolated with the aid of the trouble shooting procedures and traced through OK and NOT OK paths to the appropriate charts or other specified rectification action as may be necessary. If a defect occurs, perform the appropriate rectification action, then repeat the operation at which the defect was encountered to ensure the operation is OK.

Bracketed numbers in the procedures and charts indicate items on the component identification table (Ref. Table 101). The table provides information, including component location, required for rectification.

All procedures dealing with trouble shooting are based on the assumption that electrical wiring is serviceable, all associated circuit breakers are set and electrical power is available, unless otherwise stated. If the fault is not rectified, check the wiring in accordance with the Wiring Diagram Manual

Printed in England

(Ref. Table 101).

2. Prepare

A. Equipment and Materials

DESCRIPTION	PART NO.
Electrical Ground Power Unit	

B. Check that the following circuit breakers are set

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
HYD PUMP CONT	14-216	M 656	A16
HYD SELECTOR VALVE CONT	15-216	M 626	F22
No1 MAIN BUS GALLEY SUP	22-215	H1896	
No4 MAIN BUS GALLEY SUP	22-216	H1893	

C. Open access door 153BB and make certain that fluid level in the 3 tanks is normal.

D. Pressurize hydraulic tanks (Ref. 29-13-00)

E. On SERVO CONTROLS unit, control switches must be in NORMAL position.

F. On Flight Engineer's GROUND HYD CHECK OUT panel, control switches 1G-Y and 2B-Y must be in OFF position.

G. Connect electrical ground power unit and energize the aircraft electrical retwork (Ref. 24-41-00, Servicing).

H. On Flight Engineer's GROUND HYD CHECK OUT panel, place selector switch in GREEN/BLUE position.

3. Trouble Shooting

On GROUND HYD CHECK OUT control panel M 627 [17], place PUMP 1 G-Y switch in ON position.
PUMP 1 G-Y switch remains in ON position.
Green system pressure is normal.
Yellow and BLUE system pressure is zero. IF

- OK
- NOT OK -- PUMP 1 G-Y switch does not remain in ON position.
  Ref. Chart 101
- NOT OK -- Green system pressure remains zero.
  Ref. Chart 102
- NOT OK -- Yellow system pressure increases.
  Ref. Chart 103

On GROUND HYD CHECK OUT control panel M 627 [17], place PUMP 2 B-Y switch in ON position.
PUMP 2 B-Y switch remains in ON position.
Green and Blue system pressure is normal.
Yellow system pressure is zero. IF

- OK
- NOT OK -- PUMP 2 B-Y switch does not remain in ON position.
  Replace control panel M 627 [17]
- NOT OK -- Blue system pressure remains zero.
  Ref. Chart 104
- NOT OK -- Yellow system pressure increases.
  Ref. Chart 105

```
****************************************************
* On GROUND HYD CHECK OUT control panel M 627 [17], *
* place selector switch in BLUE/YELLOW position.    *
* Blue system pressure is normal.                   *
* Yellow system pressure is normal.                 *
* Green system pressure is zero. IF                 *
****************************************************
   ||    |
   ||    |        ------------------------------------------------
   ||    |        | Yellow system pressure is normal.             |
   OK    |-NOT OK--| Blue system pressure is zero.                |
   ||    |        | Ref. Chart 106                                |
   ||    |        ------------------------------------------------
   ||    |
   ||    |
   ||    |        ------------------------------------------------
   ||    |        | Green system pressure is normal.              |
   ||    |-NOT OK--| Blue system pressure is normal.              |
   ||             | Yellow system pressure is zero.               |
   ||             | Ref. Chart 107                                |
   ||             ------------------------------------------------
****************************************************
* On GROUND HYD CHECK OUT control panel M 627 [17], *
* place selector switch in YELLOW/YELLOW position.  *
* Yellow system pressure is normal.                 *
* Green and Blue system pressure is zero. IF        *
****************************************************
   ||    |
   ||    |        ------------------------------------------------
   ||    |        | Yellow system pressure is normal.             |
   OK    |-NOT OK--| Blue system pressure is normal.              |
   ||             | Ref. Chart 108                                |
   ||             ------------------------------------------------
   ||
****************************************************
* On GROUND HYD CHECK OUT control panel M 627 [17], *
* place selector switch in GREEN/YELLOW position.   *
* Green and Yellow system pressure is normal.       *
* Blue system pressure is zero. IF                  *
****************************************************
   ||    |
   ||    |        ------------------------------------------------
   ||    |        | Yellow system pressure is normal.             |
   OK    |-NOT OK--| Green system pressure is zero.               |
   ||    |        | Ref. Chart 109                                |
   ||    |        ------------------------------------------------
   ||
   ||
   ||
   ||
   ||
```

```
 ||      |
 ||      |          -----------------------------------------------
 ||      |         | Blue system pressure is normal.              |
 ||      |-NOT OK--| Greem system pressure is normal.             |
 ||                | Yellow system pressure is zero.              |
 ||                | Ref. Chart 110                               |
 ||                 -----------------------------------------------
 ||
*****************************************************
* On GROUND HYD CHECK OUT control panel M 627 [17], *
* place selector switch in YELLOW/YELLOW position.  *
* Yellow system pressure is normal.                 *
* Green and Blue system pressure is zero. IF        *
*****************************************************
 ||      |
 ||      |          -----------------------------------------------
 ||      |         | Yellow system pressure is normal.            |
 OK      |-NOT OK--| Green system pressure is normal.             |
 ||                | Ref. Chart 111                               |
 ||                 -----------------------------------------------
 ||
*****************************************************
* Ground pressurizing system is serviceable.        *
*                                                   *
*****************************************************
```

```
****************************************----------------------------------
* PUMP 1 G-Y SWITCH DOES NOT REMAIN    *| GROUND EQUIPMENT REQUIRED
* IN ON POSITION.                      *|--------------------------------|
****************************************| DESCRIPTION         PART NO    |
                                        |--------------------------------|
                                        | MULTIMETER                     |
                                        ----------------------------------

*****************************************************
* On GROUND HYD CHECK OUT control panel M 627 [17], *
* place PUMP 2 B-Y switch in ON position.           *
* PUMP 2 B-Y switch remains in ON position. IF      *
*****************************************************
        |               |                   ----------------------------------
     NOT OK             |-OK---------------| Replace control panel M 627|
        |                                  | [17]                          |
        |                                   ----------------------------------
*****************************************************************************
* Place PUMP 1 G-Y and PUMP 2 G-Y switches in OFF position.                 *
* Switch off electrical ground power unit (Ref. 24-41-00, S).               *
* Trip circuit breaker M 626 [7], panel 15-216 map ref. F 22                *
* Remove control panel M 627 [17].                                          *
* Set circuit breaker M 626 [7].                                            *
* Energize the aircraft electrical network (Ref. 24-41-00,S)                *
* Check voltage at terminal A of connector M 627 A                          *
*****************************************************************************
                        |
                        |
                        0V
                        |
            *********************************
            * Check circuit breaker M 626 [7].*
            * IF                            *
            *********************************
                        |           |
                        OK          |----------------|
                        |                         NOT OK
                        |                            |
            ---------------------------     ---------------------------
            | Check contactor X 21 [18] |   | Replace circuit         |
            |                           |   | breaker M 626 [7]       |
            ---------------------------     ---------------------------
```

Chart 101

```
*************************************---------------------------------
* GREEN SYSTEM PRESSURE REMAINS ZERO *| GROUND EQUIPMENT REQUIRED    |
*                                    *|------------------------------|
**************************************| DESCRIPTION        PART NO   |
                                      |------------------------------|
                                      | MULTIMETER                   |
                                      --------------------------------

*****************************************************************
* On GROUND HYD CHECK OUT control panel M 627 [17], place PUMP   *
* 2 B-Y switch in ON position. Blue system pressure increases. IF*
*****************************************************************
       |       |               ----------------------------------------
       OK      |----NOT OK---| Check circuit breaker M 626 [8]        |
       |                       ----------------------------------------
       |
****************************************************************
* Place PUMP 1 G-Y switch in OFF position.                      *
* Trip circuit breaker M 656 [8], panel 14-216 map ref. A 16.   *
* In zone 541, disconnect pump M 633 [11].                      *
* Set circuit breaker M 656 [8].                                *
* Place PUMP 1 G-Y switch in ON position.                       *
* Check 3-phase voltage, between the terminals and connector    *
* M 633 A. IF                                                   *
****************************************************************
       |       |
       |       |                 -----------------------------------
       0V      |--200V 400HZ-----| Replace pump M 633 [11].         |
       |                         |                                  |
       |                         -----------------------------------
**********************************************
* In zone 165, check voltage between terminals *
* L1, L2, L3 of contactor M 631 [14]. IF       *
**********************************************
       |       |              ----------------------------------------
       0V      |--200V 400HZ--| Check voltage at terminals X 1 and   |
       |                      | X 2 of contactor M 631 [14]. IF      |
       |                      ----------------------------------------
       |                               |              |
       |---------------------------0V--|         115V 400HZ
       |                                              |
       |                                       --------------------
       |                                       | Replace contactor |
       |                                       | M 631 [14].       |
       |                                       --------------------
       |
       |
```

Chart 102 (Sheet 1 of 2)

Printed in England

R

0V

*Check voltage between terminals A and 4 of contactor H 1888 [16] zone 12-215. IF

0V | 115 VAC → Replace circuit breaker M 657 [19]

*Check voltage between terminals A and 3 of contactor H 1888 [16] zone 12-215. IF

0V | 115 VAC → Replace contactor H 1888 [16]

Replace control panel M 627 [17]

Chart 102 (Sheet 2 of 2)

PRINTED IN ENGLAND

****
*YELLOW SYSTEM PRESSURE INCREASES. *
****

GROUND EQUIPMENT REQUIRED	
DESCRIPTION	PART NO
MULTIMETER	-

****
*Trip circuit breaker M 626 [7],   *
*panel 15-216 map ref. F 22.   *
*In zone 541 AB disconnect   *
*electrical connector of valve   *
*M 635 [9].   *
*Set circuit breaker M 626 [7].   *
*On connector M 635 A, check voltage *
*between terminals A and C.   IF   *
****

0V — Replace control panel M 627 [17].

28V — Replace valve M 635 [9].

Chart 103

PRINTED IN ENGLAND

****
*BLUE SYSTEM PRESSURE REMAINS ZERO *
****

GROUND EQUIPMENT REQUIRED	
DESCRIPTION	PART NO
MULTIMETER	-

****
*Place PUMP 2 B-Y switch in OFF position. *
*Trip circuit breaker M 656 [8] HYD PUMP CONT, panel 14-216 *
map ref. A16. In zone 641 AB, disconnect electric pump M 632
*connector. Set circuit breaker M 656. *
*Place PUMP 2 B-Y switch in ON position. *
Check 3-phase voltage between terminals of connector M 632.IF
****

OV

200V 400HZ — Replace B/Y electric pump M632 [12].

****
*In zone 166, check voltage between terminals L1-L2-L3 of *
*contactor M630 [13]. IF *
****

OV

200V 400HZ — Check voltage at terminals X1-X2 of contactor M 630 [13]. IF

- OV
- 115V 400HZ — Replace contactor M 630 [13]

OV

Chart 104 (Sheet 1 of 2)

PRINTED IN ENGLAND

R

```
  |
 OV
  |
*********************************************
*Check voltage between terminals A and 4 of *
*contactor H 1885 [15] zone 12-216.  IF     *
*********************************************
    |              |
   OV           115 VAC------------------------+
    |                                          |
*********************************    +---------------------------+
*Check voltage between terminals*    |Replace circuit breaker    |
*A and 3 of contactor H 1885    *    |M 658 [20]                 |
*[15] zone 12-216.  IF          *    +---------------------------+
*********************************
    |              |
   OV           115 VAC------------------------+
    |                                          |
******************                   +---------------------------+
*Replace control *                   |Replace contactor H 1885   |
*panel M 627 [17]*                   |[15]                       |
******************                   +---------------------------+
```

Chart 104 (Sheet 2 of 2)

PRINTED IN ENGLAND

YELLOW SYSTEM PRESSURE INCREASES.

GROUND EQUIPMENT REQUIRED	
DESCRIPTION	PART NO
MULTIMETER	-

Trip circuit breaker M 626 [7], panel 15-216 map ref. F 22.
In zone 641 AB, disconnect valve M 634 [10].
Set circuit breaker M 626 [7].
On connector M 634 A, check voltage between terminals A and C. IF

- 0V → Replace control panel M 627 [17].
- 28V → Replace valve M 634 [10].

Chart 105

```
*************************************
*GREEN SYSTEM PRESSURE IS NORMAL.   *
*BLUE SYSTEM PRESSURE IS ZERO.      *
*************************************

*************************************
*On GROUND HYD CHECK OUT control    *
*panel M 627 [17], place PUMP 1 G-Y *
*switch in OFF position.            *
*Yellow system pressure remains     *
*normal.  IF                        *
*************************************
```

YES — Replace valve M 634 [10].

NO — Ref. Chart 104.

Chart 106

****
*GREEN SYSTEM PRESSURE IS NORMAL. *
*BLUE SYSTEM PRESSURE IS NORMAL *
*YELLOW SYSTEM PRESSURE IS ZERO. *
****

GROUND EQUIPMENT REQUIRED	
DESCRIPTION	PART NO
MULTIMETER	-

****
*Trip circuit breaker M 626 [7], *
*panel 15-216 map ref. F 22. *
*In zone 541 AB, disconnect *
*valve M 635 [9]. *
*Set circuit breaker M 626 [7]. *
*On connector M 635 A, check voltage *
*between terminals A and C. IF *
****

0V

28V — Replace control panel M 627 [17].

0V — Replace valve M 635 [9].

PRINTED IN ENGLAND

Chart 107

GROUND EQUIPMENT REQUIRED	
DESCRIPTION	PART NO
MULTIMETER	-

```
**************************************
*YELLOW SYSTEM PRESSURE IS NORMAL.   *
*BLUE SYSTEM PRESSURE IS NORMAL.     *
**************************************
```

```
********************************************
*On GROUND HYD CHECK OUT control panel     *
*M 621 [17], place PUMP 1 G-Y and 2 B-Y    *
*switches in OFF position.                 *
*Trip circuit breaker M 626 [7], panel     *
*15-216 map ref. F 22.                     *
*In zone 641 AB, disconnect valve          *
*M 634 [10].                               *
*Set circuit breaker M 626 [7].            *
*Place PUMP 2 B-Y switch in ON position    *
*On connector M 634 A, check voltage       *
*between terminals A and C.  IF            *
********************************************
```

28V — Replace control panel M 627 [17].

0V — Replace valve M 634 [10].

Chart 108

PRINTED IN ENGLAND

```
**************************************
*YELLOW SYSTEM PRESSURE IS NORMAL.   *
*GREEN SYSTEM PRESSURE IS ZERO.      *
**************************************

**************************************
*On GROUND HYD CHECK OUT control     *
*panel M 627 [17], place PUMP 2 B-Y *
*switch in OFF position.             *
*Yellow system pressure remains      *
*normal.  IF                         *
**************************************
```

YES — Replace valve M 635 [9].

NO — Ref. Chart 102.

Chart 109

PRINTED IN ENGLAND

GROUND EQUIPMENT REQUIRED	
DESCRIPTION	PART NO
MULTIMETER	-

*BLUE SYSTEM PRESSURE IS NORMAL.
*GREEN SYSTEM PRESSURE IS NORMAL.
YELLOW SYSTEM PRESSURE REMAINS ZERO.

*On GROUND HYD CHECK OUT control panel
*M 627 [17], place PUMP 1 G-Y and 2 B-Y
*switches in OFF position.
*Trip circuit breaker M 626 [7], panel
*15-216 map ref. F 22.
*In zone 641 AB, disconnect valve
*M 634 [10].
*Set circuit breaker M 626 [7].
*Place PUMP 2 B-Y switch in ON position.
*On connector M 634 A, check voltage
*between terminals A and C. IF

28V → Replace control panel M 627 [17].

OV → Replace valve M 634 [10].

Chart 110

PRINTED IN ENGLAND

```
**************************************
*YELLOW SYSTEM PRESSURE IS NORMAL.   *
*GREEN SYSTEM PRESSURE IS NORMAL.    *
**************************************
```

GROUND EQUIPMENT REQUIRED	
DESCRIPTION	PART NO
MULTIMETER	-

```
************************************************
*On GROUND HYD CHECK OUT control panel M 627   *
*[17], place PUMP 1 G-Y and 2 B-Y switches in  *
*OFF position.                                 *
*Trip circuit breaker M 626 [7], panel 15-216  *
*map ref. F 22.                                *
*In zone 541 AB, disconnect selector M 635 [9] *
*Set circuit breaker M 626 [7].                *
*Place PUMP 1 G-Y switch in ON position.       *
*On connector M 635 A, check voltage between   *
*terminals A and C.  IF                        *
************************************************
```

28V → Replace control panel M 627 [17].

0V → Replace valve M 635 [9].

Chart 111

PRINTED IN ENGLAND

ITEM NO. AND DESCRIPTION	ACCESS PANEL	PANEL/ ZONE	EQUIP. IDENT.	POSITION	MANUAL REF. MAINT. TOPIC	WIRING DIAGRAM
R [1] DELETED						
R [2] DELETED						
R [3] DELETED						
R [4] DELETED						
R [5] DELETED						
R [6] DELETED						
[7] Circuit breaker	-	15-216	M626	F-22	24-50-00 R/I	29-23-01
[8] Circuit breaker	-	14-216	M656	A-16	24-50-00 R/I	29-23-01
[9] Valve-Green/Yellow hyd. sys. electro-hydraulic selector	541 AB	541	M635		29-23-11 R/I	29-23-01
[10] Valve-Blue/Yellow hyd. sys. electro-hydraulic selector	641 AB	641	M634		29-23-11 R/I	29-23-01
[11] Pump-electric, Green/Yellow hyd. sys.	541 AB	541	M633		29-23-12 R/I	29-12-01
[12] Pump-electric, Blue/Yellow hyd. sys.	641 AB	641	M632		29-23-12 R/I	29-23-01

PRINTED IN ENGLAND

					MANUAL REF.	
ITEM NO. AND DESCRIPTION	ACCESS PANEL	PANEL/ ZONE	EQUIP. IDENT.	POSITION	MAINT. TOPIC	WIRING DIAGRAM
[13] Contactor-Blue/Yellow hyd. sys. electric pump		166	M630		29-00-00 R/I	29-23-01
[14] Contactor-Green/Yellow hyd. sys. electric pump		165	M631		29-00-00 R/I	29-23-01
[15] Contactor		12-216	H1885			29-23-01
[16] Contactor		12-215	H1888			29-23-01
[17] Control panel-GROUND HYD CHECK OUT			M627	Flight Engin-eer's panel		29-23-01
[18] Contactor - ground power breaker		24-216	X21			
R [19] Circuit Breaker-Remote Control		128	M657		29-23-13 R/I	29-23-01
R [20] Circuit Breaker-Remote Control		128	M658		29-23-13 R/I	29-23-01

Component Identification
Table 101

PRINTED IN ENGLAND

GROUND PRESSURIZING SYSTEM - ADJUSTMENT/TEST

WARNING : MAKE CERTAIN THAT THE POSITIONS OF NOSE AND MAIN GEAR DOORS CORRESPOND WITH THE ACTUAL POSITIONS OF THE RESPECTIVE OPERATING HANDLES.
HANDLE LOCKED, INDICATOR PLATE SHOWING WHITE : DOORS CLOSED.
HANDLE LOCKED, INDICATOR PLATE SHOWING RED : DOORS OPEN.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE MAKE CERTAIN THAT THE TRAVEL RANGES OF THE CONTROL SURFACES ARE CLEAR.

BEFORE PRESSURIZING HYDRAULIC SYSTEMS, CHECK THAT ALL CONTROLS ARE SET TO CORRESPOND WITH THE ACTUAL POSITION OF THE SERVICES THEY OPERATE.

MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISMS SAFETY DEVICES ARE IN POSITION.

PRINTED IN ENGLAND

1. General

The ground pressurizing system (electric pumps) is to be only used for minor ground operation checks e.g. air intake B.I.T.E. checks, flying control servo rigging. It must not be used for extensive system checks requiring longer than 15 minutes system pressurization. Any extensive system checks requiring hydraulic pressurizing longer than this period, hydraulic ground power units should be used. (Ref.29-11-00, 29-12-00 and 29-21-00 p/b 300).

2. Functional Test

CAUTION: OPERATION OF GROUND PUMPS IS RESTRICTED TO 15 MINUTES WITH 30 MINUTES COOLING PERIOD BETWEEN OPERATIONS. PUMP OPERATION FOR LONGER PERIODS EFFECTS PUMP MOTOR SERVICEABILITY DUE TO ITS POTENTIAL FOR OVERHEATING AND SUBSEQUENT FAILURE.

Check for correct operation of ground pressurization system.

A. General

The object of the test is to check for correct pressurization of the aircraft hydraulic systems by the ground pressurization system electric pumps.

B. Equipment and Materials

DESCRIPTION	PART NO.
Electrical Ground Power Unit	
Hydraulic Tank Pressurizing Equipment (Air Bottle with Pressure Reducing Valve)	
Access Platform	

C. Prepare

(1) Make certain that the following circuit breakers are set :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
HYD GRND CHECK OUT PUMP CONT	14-216	M 656	A16
HYD GRND CHECK OUT SEL VALVE CONT	15-216	M 626	F22

(2) Open access door 153BB and make certain that hydraulic fluid level in the three tanks is normal.

(3) Open door 151DB and depressurize Green, Blue and Yellow hydraulic systems.

(4) Check nitrogen pressure in the Green, Blue and Yellow system accumulators.

(5) On overhead panel, make certain that flight control selector switches on SERVO CONTROLS box are in NORMAL position.

(6) If the tank air compressor cannot be used, connect tank pressurizing equipment to ground connector (0191) in zone 153.

(7) Connect electrical ground power unit and energize the aircraft electrical network (Ref. 21-41-00, Servicing)

D. Test

(1) Pressurize hydraulic tanks (Ref. 29-13-00, Servicing)

(2) On Flight Engineer's GROUND HYD CHECK OUT panel place selector switch in YELLOW-YELLOW position and PUMP 1G-Y and PUMP 2B-Y switches in ON position.

- On Flight Engineer's HYDRAULIC MANAGEMENT panel make certain that Yellow system pressure is between 3408 and 3553 psi (235 and 245 bars).
- On Flight Engineer's panel make certain that emergency brake pressure is between 3408 amd 3553 psi (235 and 245 bars).

(3) On circuit breaker panel 15-216, trip then reset circuit breaker M626 (F22).

- On Flight Engineer's GROUND HYD CHECK OUT panel, PUMP 1G-Y and PUMP 1B-Y switches must flip to OFF position when circuit breaker is tripped, and must remain in this position when the circuit breaker is reset.

(4) On GROUND HYD CHECK OUT panel, place selector switch in GREEN-BLUE position.

- On Flight Engineer's HYDRAULIC MANAGEMENT panel make certain that Green and Blue system pressure is between 3408 and 3553 psi (235 and 245 bars).
- the elevons must deflect upwards.

(5) On GROUND HYD CHECK OUT panel place selector switch in BLUE-YELLOW position.

- On HYDRAULIC MANAGEMENT panel make certain that Blue and Yellow system pressure is between 3408 and 3553 psi (235 and 245 bars).
- the elevons must deflect upwards.

(6) On GROUND HYD CHECK OUT panel, place selector switch in YELLOW-YELLOW position.

- On HYDRAULIC MANAGEMENT panel make certain that Yellow system pressure is between 3408 and 3553 psi (235 and 245 bars).

(7) On GROUND HYD CHECK OUT panel place selector switch in GREEN YELLOW position.

- On HYDRAULIC MANAGEMENT panel make certain that Green and Yellow system pressure is between 3408 and 3553 psi (235 and 245 bars).
- the elevons must deflect upwards.

(8) On GROUND HYD CHECK OUT panel, place selector switch in YELLOW-YELLOW position and PUMP 1G-Y and PUMP 2B-Y switches in OFF position.

E. Close-Up

(1) Disconnect and remove hydraulic tank pressurizing equipment.

(2) De-energize the aircraft electrical network and disconnect electrical ground power unit.

Printed in England

(3) Close access doors.

(4) Remove access platform.

END OF THIS SECTION

NEXT

ELECTRO-HYDRAULIC SELECTOR VALVES - REMOVAL/INSTALLATION

WARNING : MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE, MAKE CERTAIN THAT THE TRAVEL RANGES OF THE ELEVONS ARE CLEAR.

1. General

R
R The removal/installation procedure described in this topic applies to both electro-hydraulic selector valves in the ground pressurization system.

2. Electro Hydraulic Selector Valves

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform - 10 ft. 9 in. (3.282 metres)	
Blanking Plugs/Caps	
Hydraulic Fluid (Ref. 20-30-00, No.011)	
Warning Notice	
Safety Clips	
Container	

B. Prepare

R
R (1) Open access door 153BB. Depressurize Blue, Green and Yellow hydraulic tanks (Ref. 29-13-00, Servicing).

(2) Open access door 151DB. Depressurize Blue, Green and Yellow hydraulic systems.

(3) Open access doors 541AB and 641AB providing access to electro-hydraulic selectors (1436) and (1435).

(4) Trip, safety and tag the following circuit breakers :

Printed in England

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
HYD GRND CHECK OUT PUMP CONT	14-216	M 656	A16
HYD TANK COMPR CONT	15-215	M 602	D 8
HYD GRND CHECK OUT SEL VALVE CONT	15-216	M 626	F22

(5) DISPLAY WARNING NOTICES ON ENGINES 1, 2 AND 3 PROHIBITING PRESSURIZATION OF BLUE, YELLOW AND GREEN HYDRAULIC SYSTEMS BY HYDRAULIC GROUND POWER UNIT. DISPLAY A WARNING NOTICE ALSO AT FLIGHT ENGINEER'S STATION PROHIBITING USE OF GROUND PRESSURIZING ELECTRIC PUMPS.
R IF A HYDRAULIC GROUND POWER UNIT IS CONNECTED TO THE
R AIRCRAFT, DISPLAY A WARNING NOTICE ON UNIT PROHIBITING
R PRESSURIZATION OF AIRCRAFT HYDRAULIC SYSTEMS.

C. Remove

(1) Disconnect electrical connector (1).

(2) Disconnect and cap hydraulic lines (3).

(3) Remove bolts (2), remove washers and bonding strip.

(4) Remove electro-hydraulic selector.

(5) Cap selector ports.

D. Preparation of Replacement Component

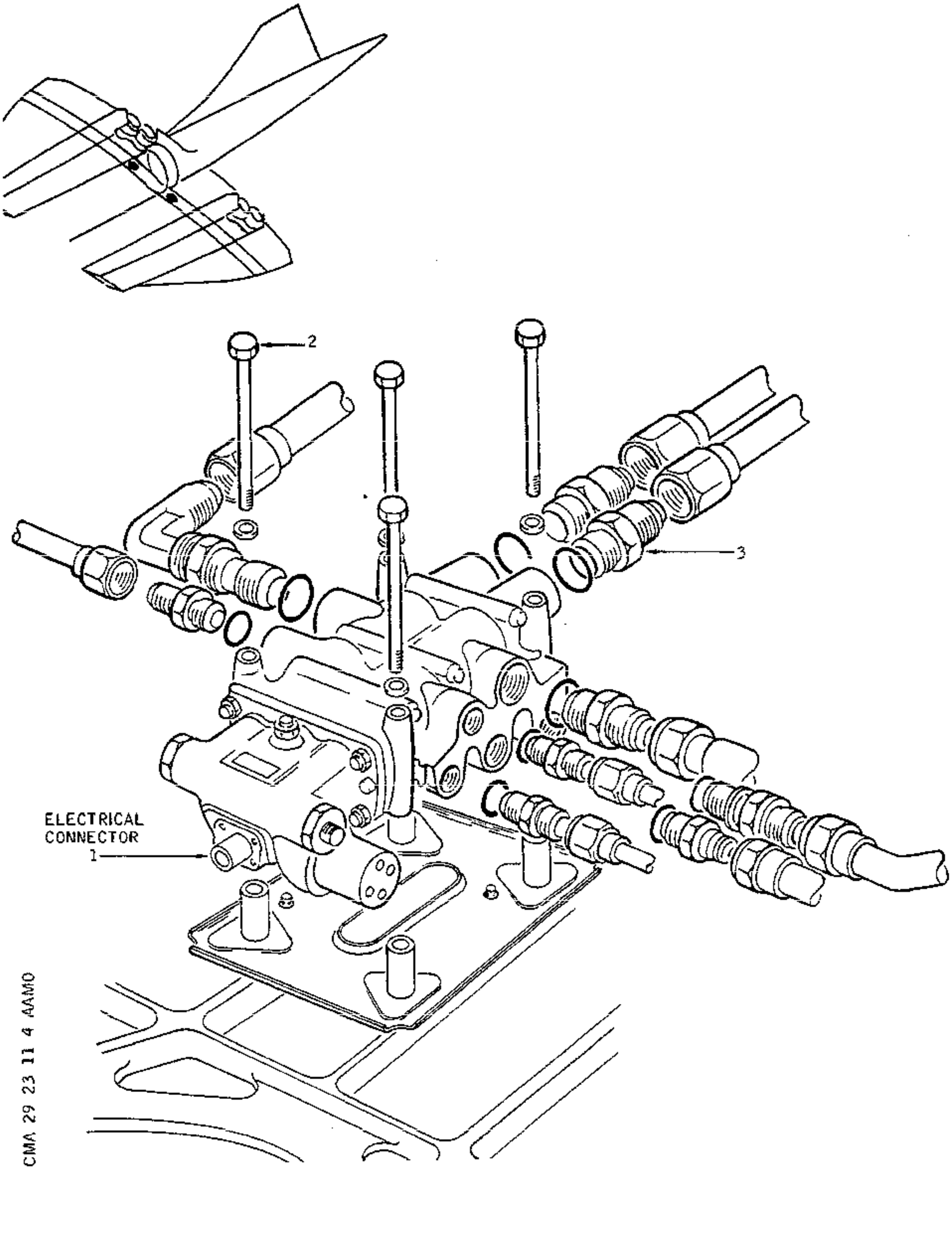
R (1) Remove hydraulic fittings from removed selector valve
R and mark to identify their respective positions.

R (2) Install the fittings on new valve, ensuring that each
R fitting is in its initial position. Install new
R packings and back-up rings.

R (3) Check that replacement unit is filled with Product
R No.11.

E. Install

(1) Position electro-hydraulic selector valve on mounting



Electro-Hydraulic Selector Valve
R Figure 401

plate.

R (2) Secure selector valve and bonding strip with bolts (2) and washers.

(3) Remove blanking caps.

(4) Connect and tighten hydraulic lines (3).

(5) Connect electrical connector.

(6) Bleed electric pump suction lines :

(a) Pressurize hydraulic tanks to 1 bar (14.503 psi) (Ref. 29-13-00, Servicing).

R (b) Bleed electric pumps at unions.

(7) Replenish hydraulic tank as required (Ref. 12-12-29).

F. Tests

R (1) Carry out functional test (Ref. 29-23-00, Adjustment/ Test).

R (2) On completion of test, check selector valve for
R leakage.

G. Close-Up

R (1) Clean the area adjacent to the selector valve and make certain that no trace of hydraulic fluid remains.

R (2) Make certain that working area is clear of tools and miscellaneous items of equipment.

(3) Remove safety clips and tags and reset circuit breakers.

(4) Remove warning notice.

R (5) Close access doors 153BB, 151DB, 541AB, 641AB.

(6) Remove access platform.

ELECTRIC PUMPS - REMOVAL/INSTALLATION

WARNING : MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE MAKE CERTAIN THAT ELEVON TRAVEL RANGES ARE CLEAR.

1. General

R
R The removal/installation procedure described in this topic applies to both of the electric pumps in the ground pressurization system.

2. Electric Pumps

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform - 10 ft. 9 in. (3.282 metres)	
Blanking Plugs/Caps	
Hydraulic Fluid (Ref. 20-30-00, No.011)	
Warning Notice	
Safety Clips	
Container (for recovery of hydraulic fluid)	

B. Prepare

R
R (1) Open access door 153BB. Depressurize hydraulic tanks (Ref. 29-13-00, Servicing).

(2) Open access door 151DB, depressurize Green, Blue and Yellow systems.

(3) Open access doors 541AB and 641AB providing access to electric pumps.

(4) Trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
HYD GRND CHECK OUT PUMP CONT	14-216	M 656	A16
HYD TANK AIR COMP	15-215	M 602	D 8
HYD GRND CHECK OUT SEL VALVE CONT	15-216	M 626	F22

R (5) DISPLAY WARNING NOTICES ON ENGINES 1, 2 AND 3 PRO-
R HIBITING PRESSURIZATION OF BLUE, YELLOW AND GREEN
R HYDRAULIC SYSTEMS BY HYDRAULIC GROUND POWER UNIT.

R DISPLAY A WARNING NOTICE AT FLIGHT ENGINEER'S STATION
R PROHIBITING USE OF GROUND PRESSURIZING SYSTEM ELECTRIC
R PUMPS.

C. Remove

(1) Disconnect electrical connector (1).

(2) Disconnect hydraulic lines (2) from electric pump and cap all open line ends and pump ports.

(3) Cut and remove lockwire, remove bolts (3), washers and bonding strip.

(4) Remove electric pump (4).

D. Preparation of Replacement Component

Make certain that replacement unit has been filled with Product No.011.

E. Install

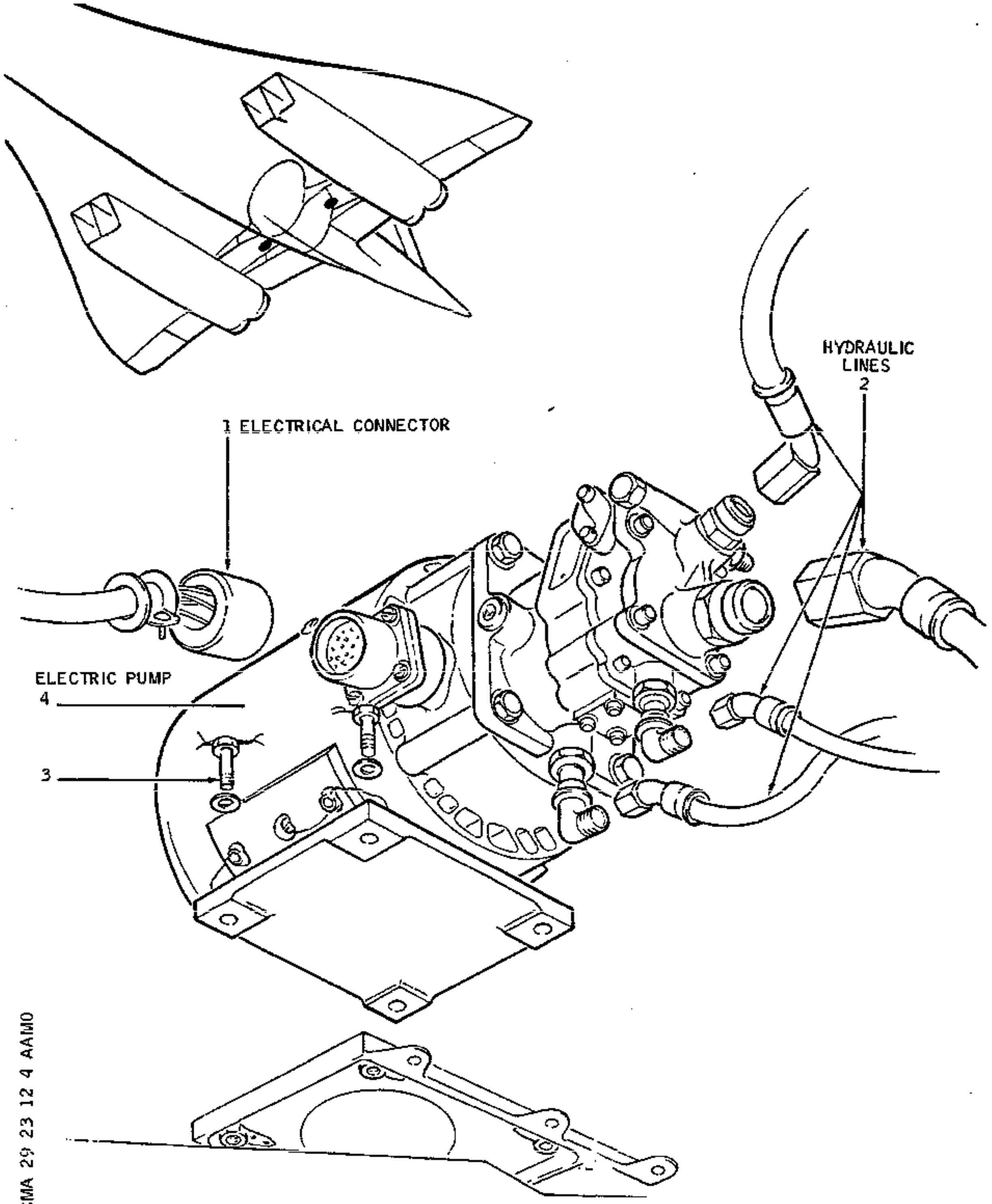
(1) Position electric pump (4) on support plate.

(2) Secure electric pump (4) and bonding strip, using bolts (3) and washers. Wirelock.

(3) Remove blanking caps.

(4) Connect and tighten hydraulic lines (2).

(5) Connect electrical connector (1).



Electric Pump
Figure 401

(6) Bleed suction line of pump as follows :

(a) Pressurize hydraulic reservoirs to 1 bar
R (14.503 psi).

(b) Bleed electric pump at suction and case drain line self-sealing couplings.

(7) Replenish hydraulic reservoirs as required (Ref. 12-12-29).

F. Test

R Carry out a functional test (Ref. 29-23-00, Adjustment/
R Test).

G. Close-Up

(1) Clean the area adjacent to the electric pump and make certain that no trace of hydraulic fluid remains.

(2) Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(3) Remove safety clips and tags and reset circuit breakers.

R (4) Remove warning notices.

R (5) Close access door.

(6) Remove access platform.

REMOTE CONTROL CIRCUIT BREAKERS - REMOVAL/INSTALLATION

WARNING: OBSERVE THE ELECTRICAL SAFETY PRECAUTIONS DETAILED IN 24-00-00.

MAKE CERTAIN THAT THE POSITION OF THE NOSE AND MAIN GEAR DOORS CORRESPONDS WITH THE ACTUAL POSITIONS OF THE RESPECTIVE OPERATING HANDLES.
HANDLE LOCKED, INDICATOR PLATE SHOWING WHITE : DOORS CLOSED.
HANDLE LOCKED, INDICATOR PLATE SHOWING RED : DOORS OPEN.

MAKE CERTAIN THAT THE LANDING GEAR POSITION INDICATED ON THE GEARS POSITION INDICATING UNIT CORRESPONDS WITH THE ACTUAL POSITION OF THE LANDING GEAR.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE, MAKE CERTAIN THAT THE TRAVEL RANGES OF THE CONTROL SURFACES ARE CLEAR.

BEFORE PRESSURIZING HYDRAULIC SYSTEMS, CHECK THAT ALL CONTROLS ARE SET TO CORRESPOND WITH THE ACTUAL POSITION OF THE SERVICES THEY OPERATE.

MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

PRINTED IN ENGLAND

1. General

The Remote Control Circuit Breakers (RCCBs) are located in the right hand side of the nosewheel bay, between frames 20 and 21. The removal/installation procedure described in this topic apply to both RCCBs in the ground pressurization system.

2. Remote Control Circuit Breakers (M657, M658)

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform - 10 ft 7in	-

B. Prepare

(1) Gain access to the nosewheel bay as detailed in 32-22-11, Removal/Installation.

(2) Isolate the electrical generation and external power supplies as detailed in 24-00-00, Servicing.

C. Remove

(1) Remove the cover assembly from the RCCBs.

(2) Make sure that the cables have visible identification. If not, temporarily identify cables to terminals.

(3) Disconnect the cables from the RCCB.

(4) Remove the screws, nuts and washers securing the RCCB to the mounting bracket and remove the RCCB.

D. Install

(1) Fit the RCCB to the mounting bracket with the screws, nuts and washers removed at para. C.(4).

(2) Connect the electrical cables to the RCCB, ensuring that the connections are made in accordance with the cable identifications and the applicable wiring diagram (Ref. WDM 29-23-11).

(3) Fit the cover assembly over the RCCBs.

E. Conclusion

(1) Make available electrical ground power as detailed in 24-41-00, Servicing.

(2) Close the nosewheel bay doors as detailed in 32-22-11, Removal/Installation.

(3) Carry out a functional test of the Ground Pressurising System, 29-23-00, Adjustment/Test.

PRINTED IN ENGLAND

RAM AIR TURBINE - DESCRIPTION AND OPERATION

1. General

The ram air turbine (RAT) is used in ultimate emergency to provide the necessary hydraulic power for control of the aircraft in the event of failure of the four engines.

The RAT is normally stowed in the left inner elevon servo-control fairing. It is ejected by a spring-powered ejection jack after being unlocked by a cartridge fired by means of a control on the 3CM's panel.

Hydraulic pressure is generated by two pumps driven by a relative wind operated, twin blade, variable pitch propellor.

One of the pumps, supplied by the Green reservoir, pressurizes the Green system. The other is supplied by the Yellow reservoir and pressurizes the Yellow system.

The RAT can only be stowed manually on the ground.

2. Description (Ref. Fig. 001)

The ultimate emergency power system comprises :

A. A mounting bracket attached to the aircraft structure, upon which is fitted :

(1) The ram air turbine, consisting of :

- A propellor,
- A pivoted support leg assembly.

(2) A gearbox.

(3) Two hydraulic pumps.

(4) Two hydraulic fluid distribution modules.

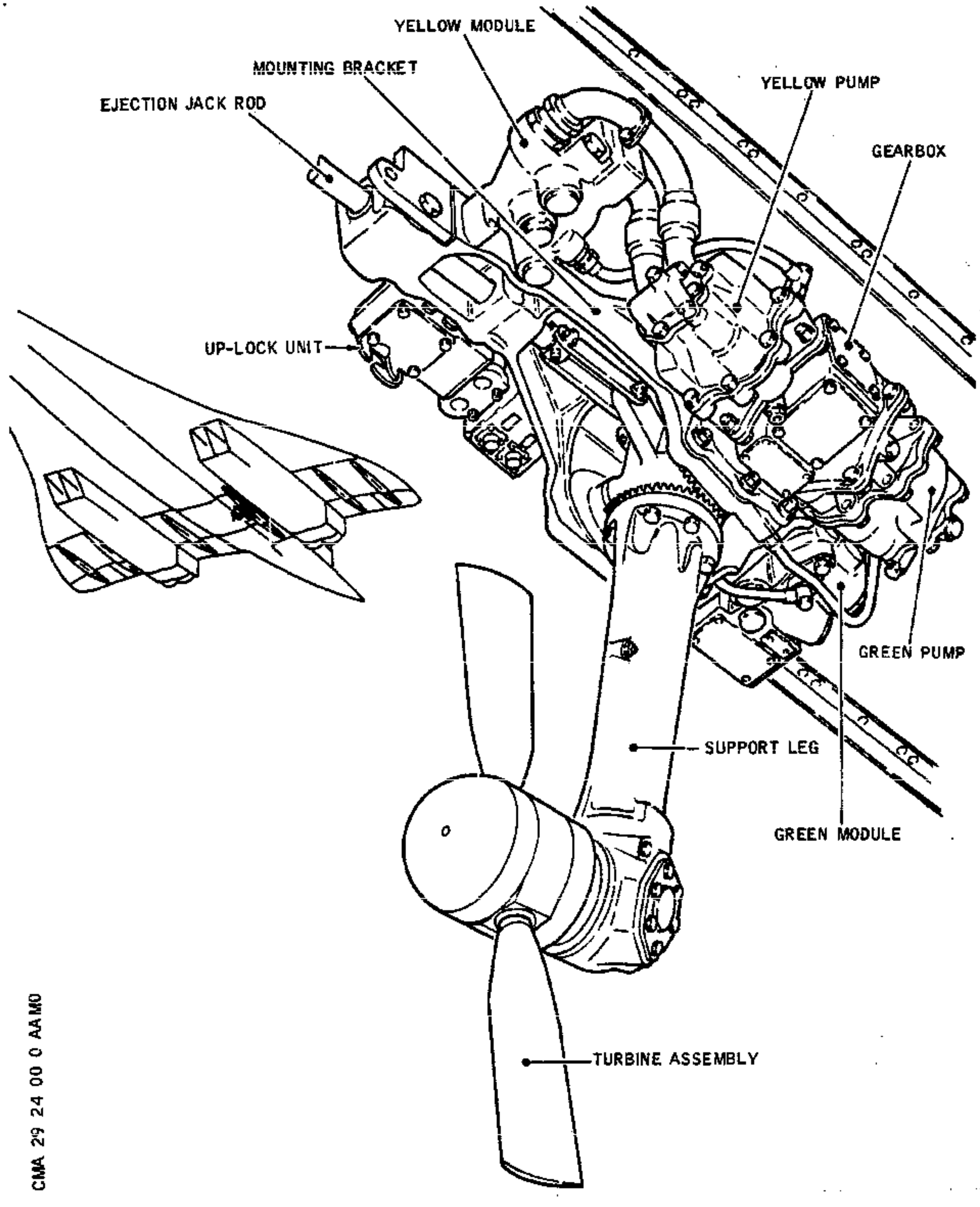
(5) The stowed position locking device.

B. An ejection jack.

C. Two HP filters.

D. A control panel.

3. Operation



- Ultimate Emergency Power System -
Ram Air Turbine When Stowed
Figure 001

The ultimate emergency system Green and Yellow pumps are connected to the normal Green and Yellow system suction and delivery lines via the Green and Yellow distribution valve modules.

These modules enable :

A. In both the Green and Yellow systems :

(1) Rapid attainment of speed by the propellor, by keeping a by-pass open between the suction and delivery lines of the pumps until their output reaches 60% of the rated flow.

(2) Filtering of the pump case drain fluid.

B. In the Green System Only :

(1) Filtering of return fluid from the propellor blade pitch control mechanism.

(2) Pressurization of the propellor blade pitch-control system by the Green pump in the event of very low temperature in the RAT housing.

4. Ram Air Turbine

A. General

The RAT, in ultimate emergency, drives two hydraulic pumps which pressurize the Green and Yellow systems.

It consists of a variable pitch propellor mounted on the end of a pivoted support leg. The pumps are driven by the propellor via a mechanical transmission.

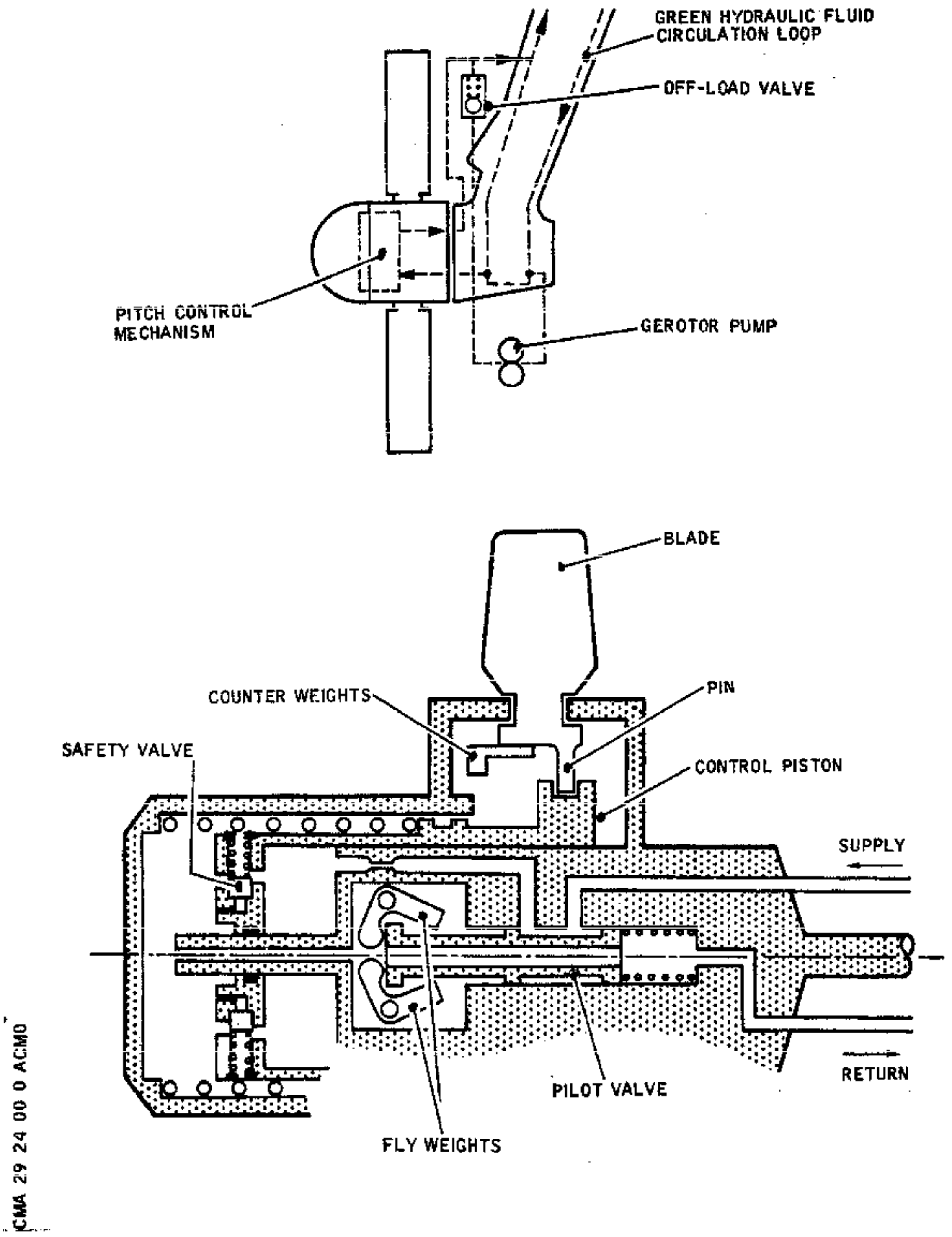
B. Turbine Assembly

(1) Description (Ref. Fig. 002)

The turbine assembly consists of a hub on which are mounted two blades, pitch variation of which is controlled hydraulically.

A latch engages in a notch in the hub, and locks the turbine assembly in the stowed position. The latch, controlled by a cam on the pivot shaft of the support leg, frees the turbine when it is about 10° from its deployed position.

The pitch control system is installed in the hub casing. It enables the turbine to be maintained at a



- Turbine Assembly
Figure 002

constant speed of rotation, whatever the relative wind speed, or the hydraulic pump load.

It comprises :

- A pitch change control piston. The blades are rotated about their longitudinal axis by the forward movement of the piston, engaging an eccentric pin.
  In the absence of hydraulic pressure the piston is moved back into the rear position by a return spring.

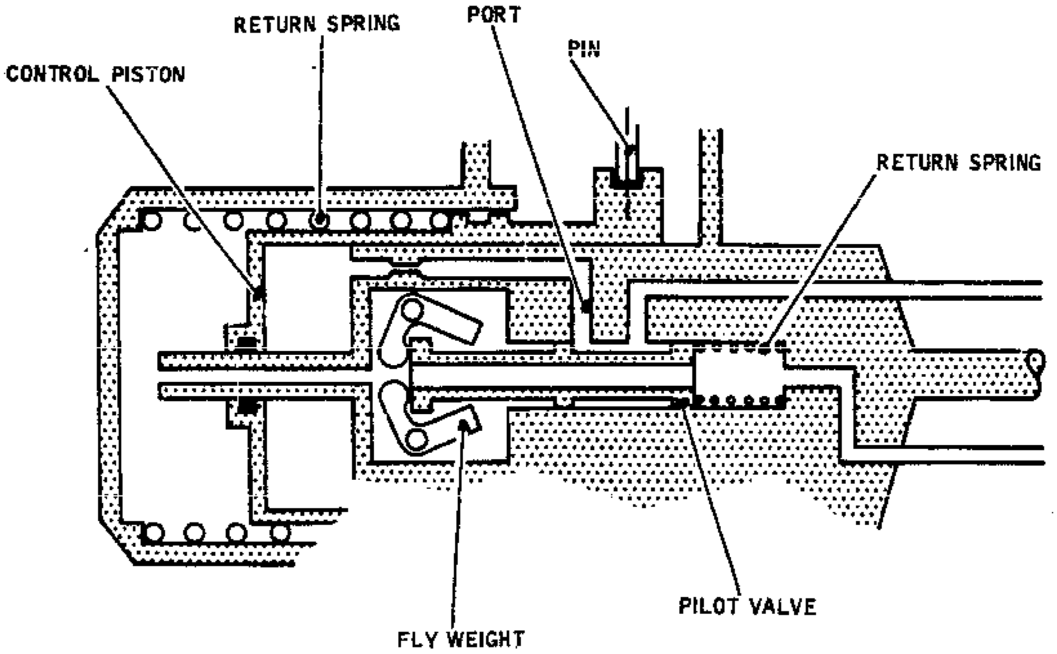
- A pilot valve which controls the hydraulic pressure applied to the piston.
  Valve displacement is controlled by governor weights and a return spring.

- An hydraulic gerotor pump, driven by the turbine and supplied from a Green hydraulic fluid circulation loop incorporated in the support leg. An offload valve limits its delivery pressure rate.

(2) Operation

(a) Rest position (Ref. Fig. 003)

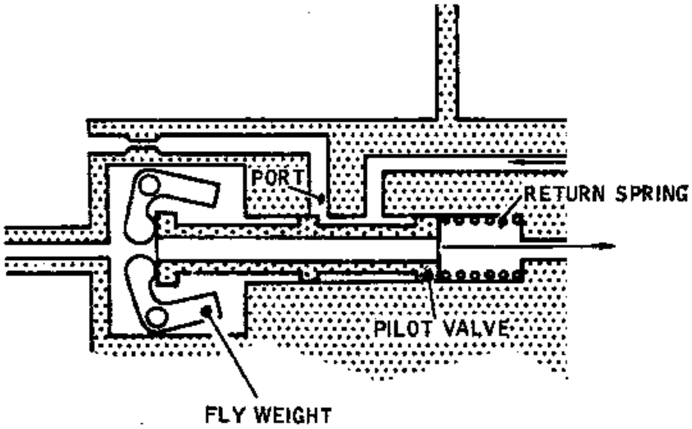
- System hydraulic pressure is at zero.
- The fly weights are in the rest position. The pilot valve, under return spring influence, is in the forward position, leaving the port clear for the passage of hydraulic fluid to the piston.
- The piston, under its own return spring load is in the rear position holding the turbine blades at course pitch.



- Pitch Control - Rest Position
Figure 003

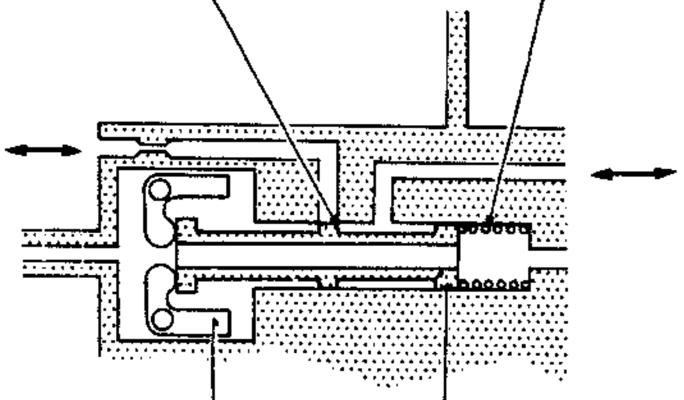
(b) Speed adjustment (Ref. Fig.004 and 005)

- The turbine begins to rotate at course pitch, driving the pitch control hydraulic pump.
- The piston is moved forward by pressure from the pump and bears on the pin. The blades move towards fine pitch and their rotational speed increases.
- The governor fly weights move away from each other and actuate the pilot valve, which gradually closes the fluid passage to the piston.
- When the nominal turbine speed of 5200 r.p.m. is reached the pilot valve shuts off the passage completely. The piston remains steady, in equilibrium between the hydraulic pressure and it's own return spring.



CMA 29 24 00 0 AGMO

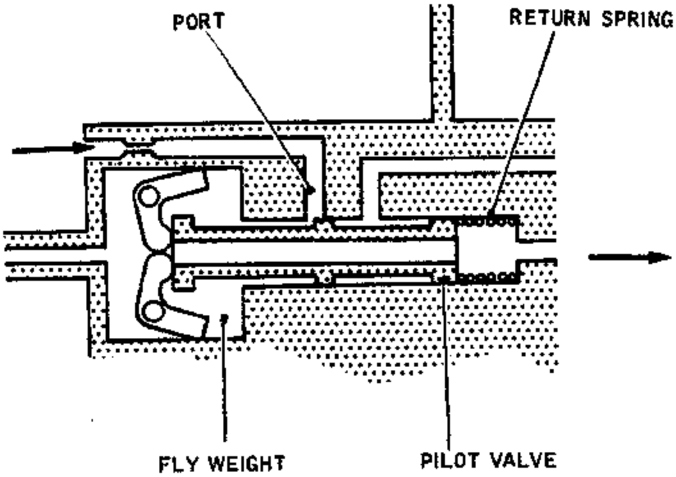
- Pitch Control - Under Speed
Figure 004



CMA 29 24 00 0 AJMO

- Pitch Adjustment - Nominal Speed
Figure 005

(c) Speed reduction (Ref. Fig. 006)

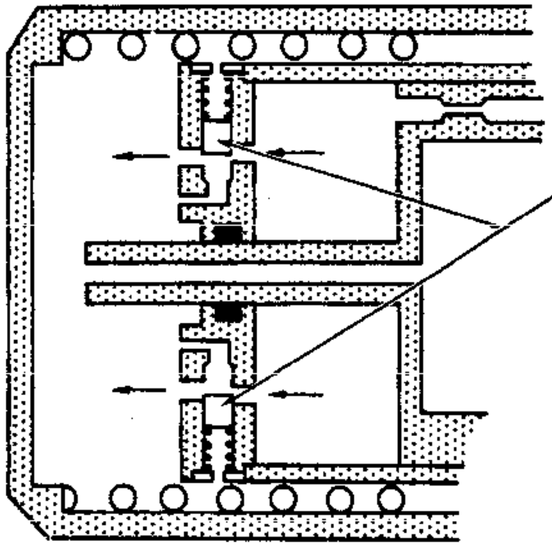


- Speed Adjustment - Overspeed
Figure 006

- When the turbine is operating at constant speed an increase in relative wind velocity or a decrease in the hydraulic power requirement entails overspeed.
- The fly weights move further away from each other, displacing the pilot valve which in turn causes the pressurized fluid acting on the piston to return to the gerotor pump inlet. The piston is moved rearwards by its return spring. Thus increasing the turbine blade pitch, and decreasing turbine speed.

(d) Overspeed protection (Ref. Fig. 007)

In the event of failure of the control system, two safety valves in the piston open by centrifugal force, when the nominal speed of rotation is exceeded by 20%.



CMA 29 24 00 0 ANMO

- Overspeed Protection
Figure 007

They release pressure from the piston, which is pushed back by its return spring. The propellor blades then adopt a coarser pitch, and the propellor speed decreases. The valves then close, thus functioning as an emergency control.

C. Support Leg (Ref. Fig.008 and 009)

(1) Description and Operation

The support leg consists of two concentric tube assemblies, which rotate relative to each other about the same axis.

The inner tube is hinged at the top on a mounting bracket attached to the aircraft structure. The pivot axis is the same as that of the gear box drive shaft.

The outer tube carries the turbine hub. A bevel gear segment at its top end mates with a stationary segment along the pivot axis of the inner tube.

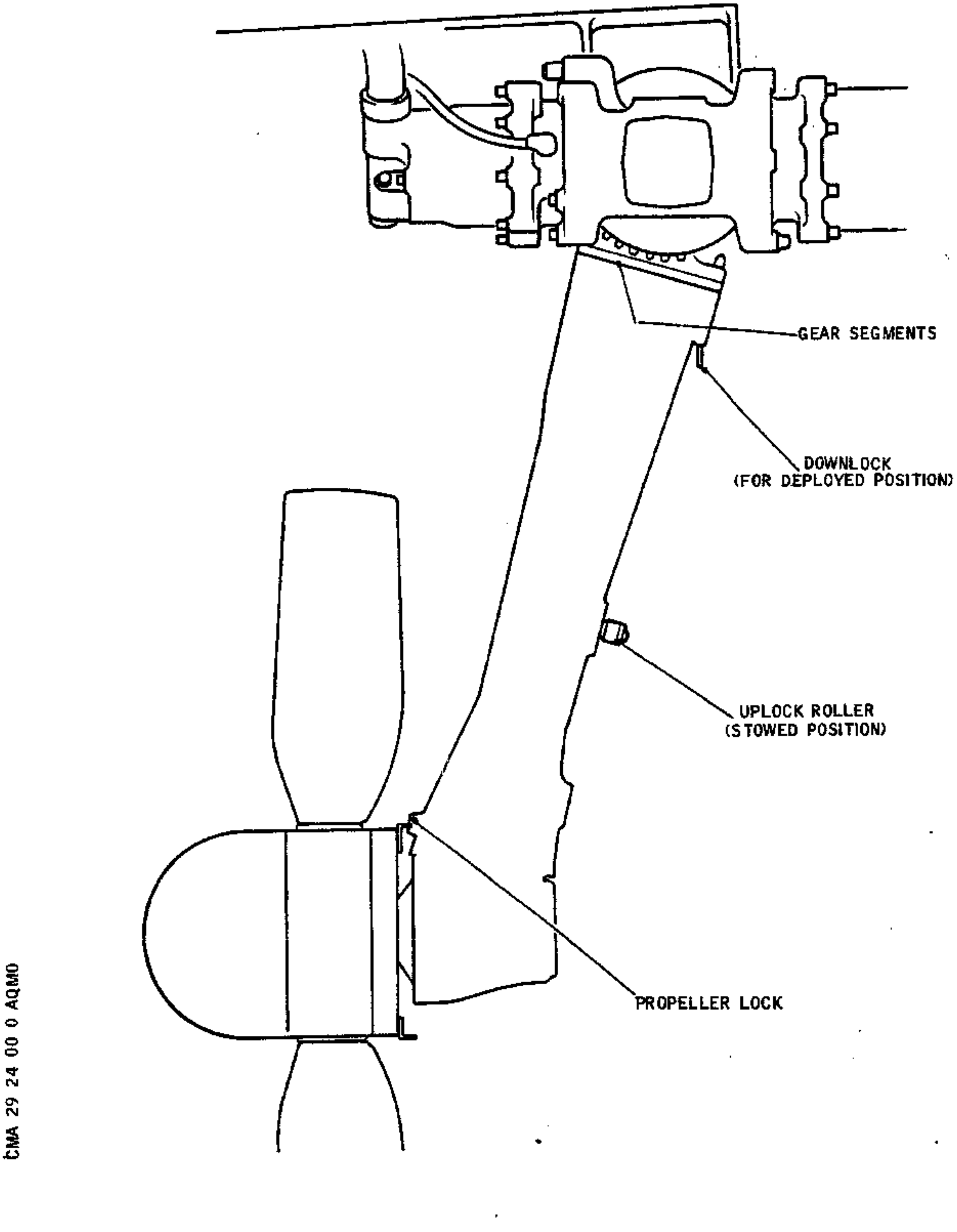
In the course of RAT stowage or deployment the two segments provoke a 90° rotation of the outer tube about its longitudinal axis. This rotary movement allows the RAT to be housed in the small space available for it when stowed, and to position correctly in the airstream when deployed.

The support leg contains :

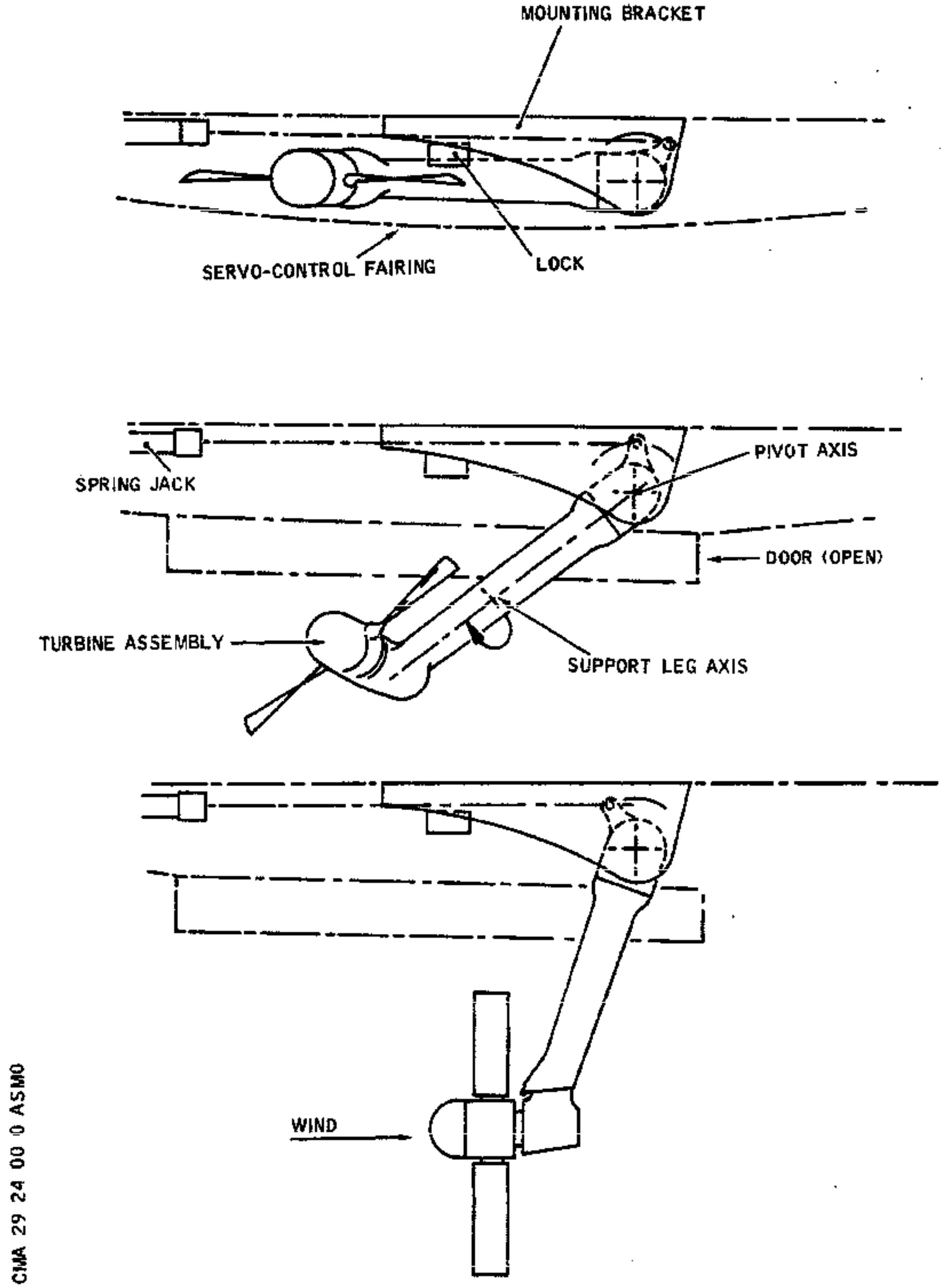
- The shaft transmitting turbine drive to the gear box, through bevel gears.
- Pipes forming the Green hydraulic fluid loop supplying the blade pitch change system.
- The locking system, which locks the turbine in a given position when the RAT is stowed.

The support leg also includes :

- A cam which operates the unlocking rollers of the fairing doors when ejection commences.
- A stowed position uplock roller.
- A downlocking system for the RAT when ejected.



- Support Leg Assembly
Figure 008



- RAT Ejection
Figure 009

5. Gearbox

The gearbox is attached to the mounting bracket at the leg pivot point.

It supports the two hydraulic pumps, to which it transmits turbine torque through a system of gears.

6. Pumps

7. Valve Modules

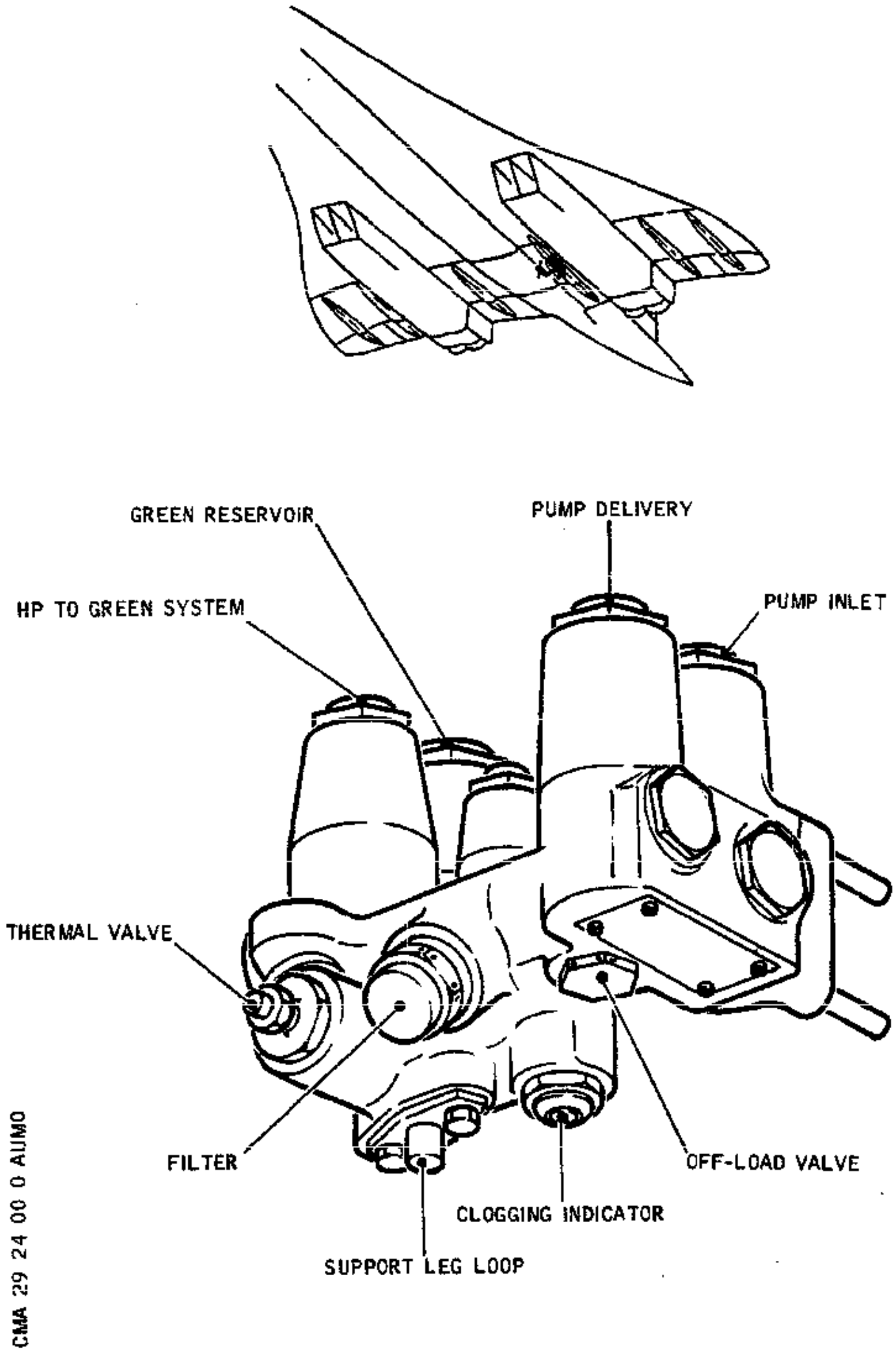
A. General

A Green and Yellow system distributor module are attached to the mounting bracket.

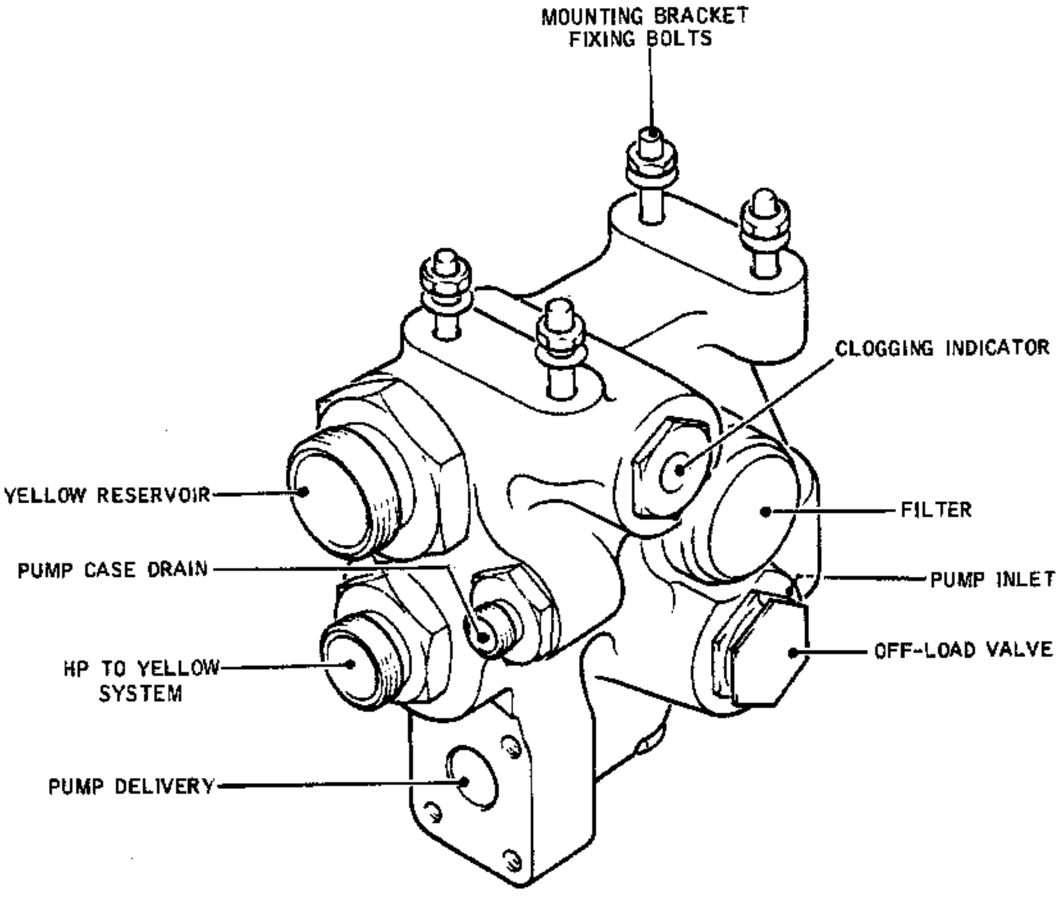
They contain the necessary components for distributing and filtering the hydraulic fluid for each system.

B. Description (Ref. Fig.010 and 011)

Each module consists of a forged aluminium alloy casing, housing various components.



- Green Module
Figure 010



CMA 29 24 00 0 AWMO

- Yellow Module

Figure 011

C. Operation (Ref. Fig. 012)

(1) Green Module

During RAT deployment, off-load valve (2) is open, forming a loop between the Green pump inlet (9) and delivery (8) lines. The turbine torque loading taken up by the pump is kept low, enabling the RAT to reach constant speed quickly.

When flow reaches about 60% of nominal output the off-load valve closes rapidly, allowing the Green system, by means of a non-return valve, to attain normal pressure.

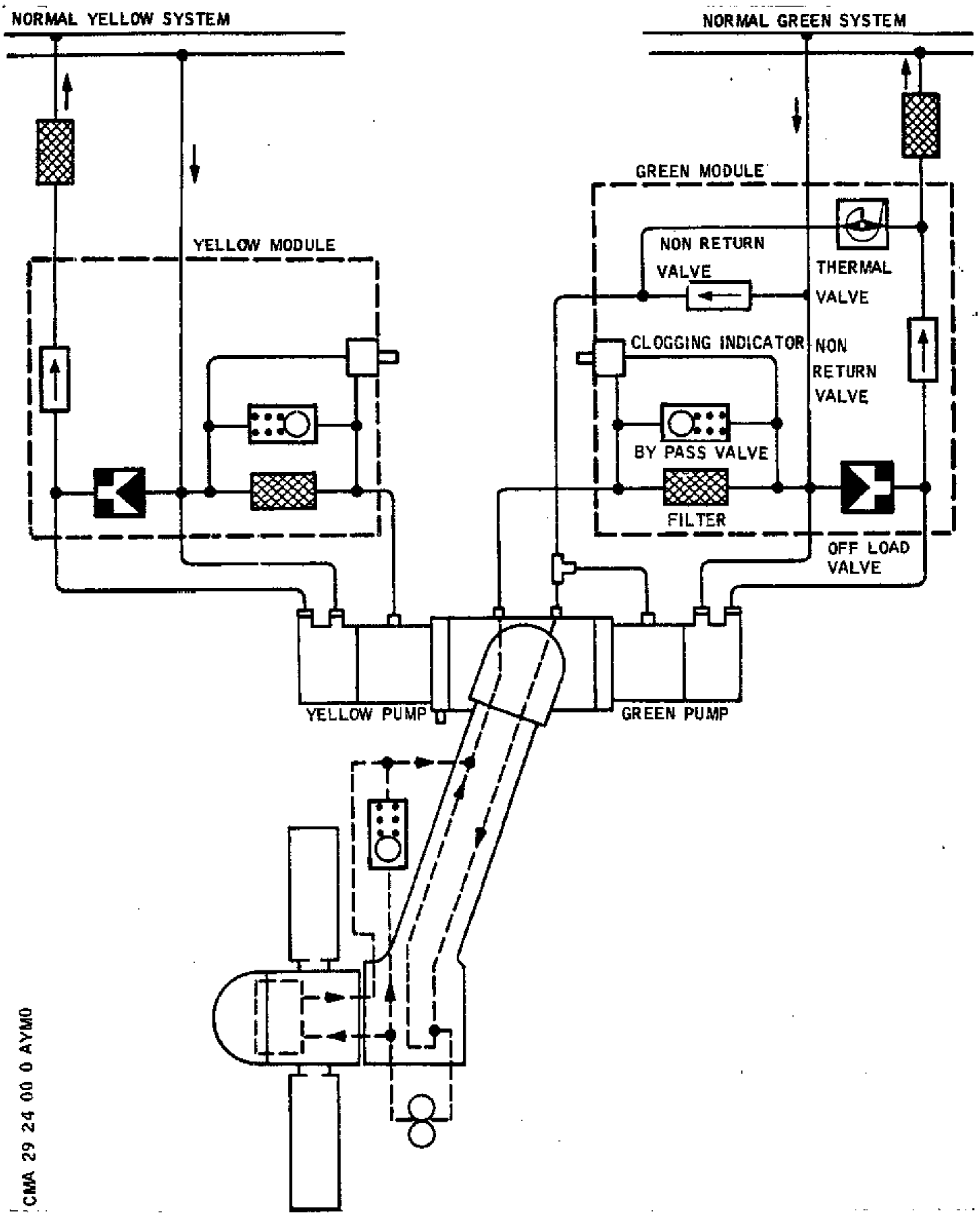
- A Green fluid circulation loop in the RAT support leg is supplied through a non-return valve. Green pump case drain fluid is fed into this loop, from which it is returned to the Green pump inlet via the filter.
- In the case of filter clogging, a by-pass valve opens and restores the return flow. A clogging indicator reveals the condition of the filter during ground inspection.
- In the event of extremely cold conditions in the RAT compartment, which could affect the operation of the pitch change gerotor pump the control system is supplied by Green system pressure via a thermal valve. A non-return valve prevents the passage of the HP flow to the reservoir and pump inlet.

(2) Yellow Module

This also comprises :

- An off-load valve, to enable the propellor to reach constant speed quickly.
- A non-return valve on the Yellow pump delivery line.
- A filter on the line returning case drain fluid to the pump inlet, also a by-pass valve and clogging indicator.

The Yellow system is not used for operation of the pitch control mechanism.



- Valve Modules

Figure 012

8. Stowed Position Uplocking System

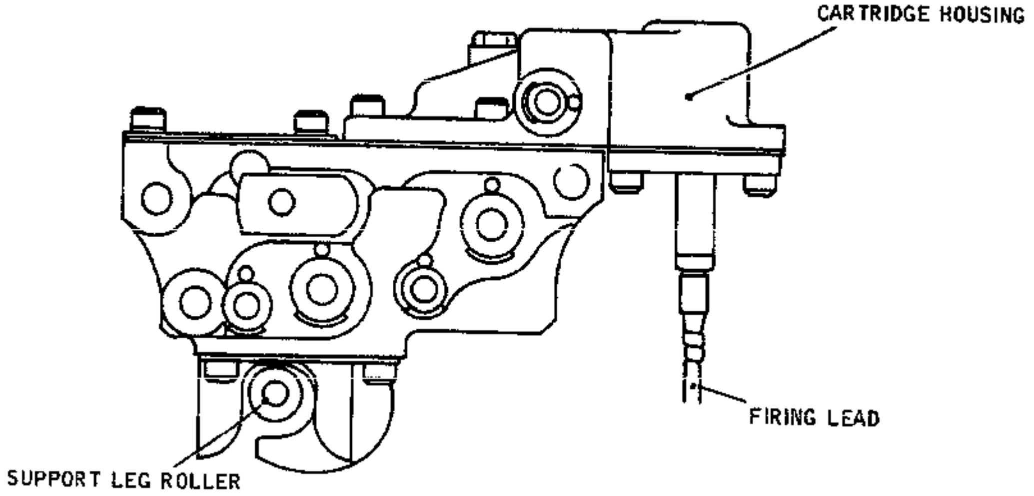
A. General

The RAT is retained in the stowed position by a lock. It is unlocking by a pyrotechnical unlocking device.

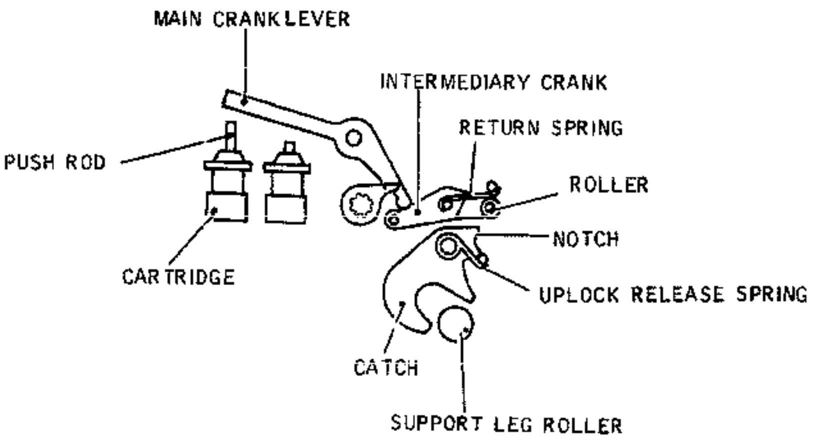
A manual unlocking device is provided for ground maintenance operations.

B. Description (Ref. Fig. 013)

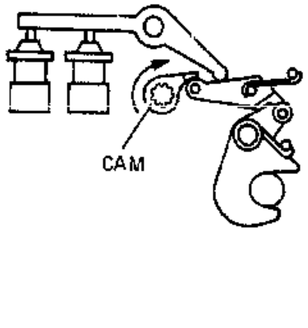
The uplocking system comprises :



UPLOCK UNIT



CARTRIDGE UPLOCK RELEASE



MANUAL UPLOCK RELEASE

CMA 29 24 00 0 BAMO

- Uplocking System - Principle of Operation
Figure 013

(1) A roller, attached to the RAT support leg.

(2) An uplock box, attached to the RAT mounting-bracket, consisting of a light alloy casing containing :

(a) Two independent push-rods each of which is operated when the associated cartridge is fired.

(b) A main crank lever.

(c) An intermediate crank lever, with return spring and roller.

(d) A pivoted catch, with return spring and notch.

(e) A manual unlocking cam.

C. Operation

(1) Uplocked position.

The support leg roller engages in the catch.

The intermediary crank lever, held in position by a return spring, locks the catch by means of the roller engaging the notch.

(2) Uplock Release In Flight

Firing of one of the uplock release cartridges operates a push-rod, which tilts the main crank lever.

The main crank lever then actuates the intermediary crank and disengages its roller from the notch in the catch.

The catch, under spring pressure, opens and frees the RAT support leg roller.

(3) Uplock Release on the Ground

The intermediary crank lever is actuated in the same way as the main crank lever, by means of a cam turned by a wrench.

It regains its initial position under return spring pressure.

9. Ejection Jack

The ejection jack provides the force necessary for deploying the RAT, and opening the fairing doors.

The cylinder rod of the jack, under spring pressure, operates a lever attached to the propellor support leg.

An incorporated hydraulic damper checks and controls the cylinder rod movement.

10. Control Panel

A. General

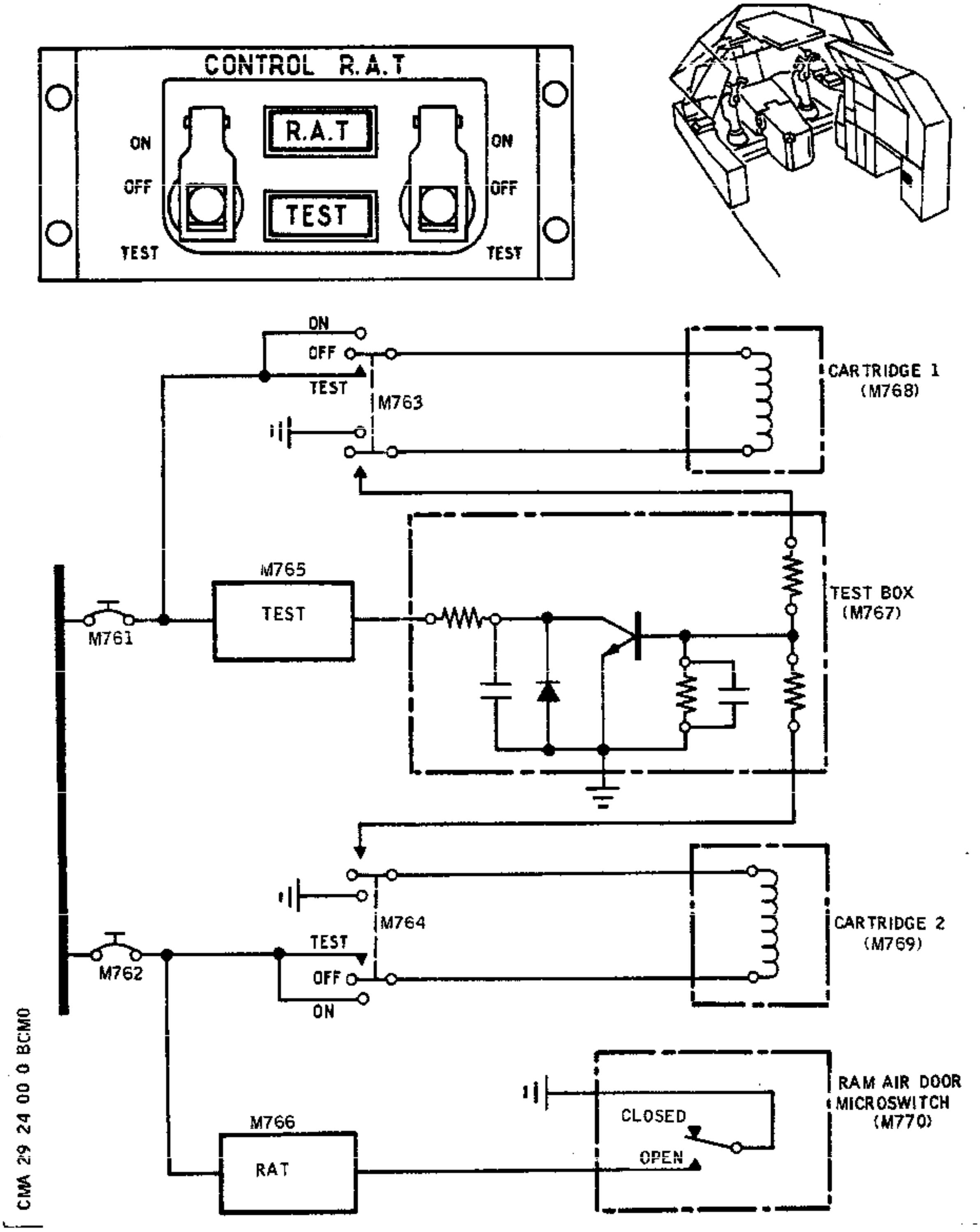
The uplock release cartridge firing electrical system is controlled from the 3CM's panel.

B. Description and Operation (Ref. Fig. 014)

The control panel includes :

- Two 3-position selector switches :
  - OFF- stable rest position
  - ON- controls RAT ejection. To obtain this fixed position it is necessary to remove a sealed cover guard.
  - TEST- for monitoring electrical circuit continuity. This is an automatic reset position, the selector returning to OFF when released.
- A green RAT indicator light, which illuminates when the fairing doors are opened for ejection of the RAT.

A blue TEST light, which illuminates when one of the selector switches is in the TEST position, and the corresponding cartridge firing circuit is closed.



- Control Panel

Figure 014

RAM AIR TURBINE - TROUBLE SHOOTING

WARNING : OBSERVE THE ELECTRICAL SAFETY PRECAUTIONS DESCRIBED IN CHAPTER 24-00-00, SERVICING.

1. General

The following trouble shooting procedures are intended to enable faults found in the Ram Air Turbine (RAT) warning circuit to be quickly rectified.

The defect can be isolated with the aid of trouble shooting procedures (Ref. Para. 3) and traced through OK and NOT OK paths to the appropriate charts or other specified rectification action as may be necessary. If a defect occurs, perform the appropriate rectification action, then repeat the operation at which the defect was encountered to ensure that the operation is OK.

Bracketed numbers in the procedures and charts indicate items on the component identification table (Ref. Table 101). The table provides information, including component location, required for rectification.

All procedures dealing with trouble shooting are based on the assumption that electrical wiring is serviceable, all associated circuit breakers are set and electrical power is available, unless otherwise stated. If the fault is not rectified, check the wiring in accordance with the Wiring Diagram Manual (Ref. Table 101).

2. Prepare

A. Equipment and Materials

DESCRIPTION	PART NO.
Electrical Ground Power Unit	
Device - Ram Air Turbine Access	E920151000
Rigging Pin - Ram Air Turbine	E930052000
Access Platform 3.160 m (10 ft. 4 in.)	

B. Make certain that the following circuit breakers are set :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
RAT TEST No.1 CART SUP	1-213	M 761	R17
RAT IND No.2 CART SUP	3-213	M 762	B10
ROOF PNL LT TEST SUP	15-216	L1002	D13

C. On Flight Engineer's CONTROL RAT panel, make certain that the guards preventing the two uplock release cartridge cont. switches from being moved accidentally to the ON position are sealed.

D. Make certain that rigging pin E930052000 is in position.

E. Position safety barrier around RAT extension area.

F. Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing).

3. Trouble Shooting

```
*****************************************************
* On Flight Engineer's panel 12-214 briefly hold    *
* LIGHTS FWD switch in TEST position. On CONTROL RAT*
* panel, RAT and TEST caption lights come on and    *
* remain on as long as switch is held in TEST       *
* position. If :                                    *
*****************************************************
    ||  |        --------------------------------------------------
    OK  NOT OK----| TEST and RAT caption lights fail to come on.    |
    ||  |        | Ref. 33-40-00, Trouble Shooting.                 |
    ||  |        --------------------------------------------------
    ||  |        --------------------------------------------------
    ||  NOT OK----| Either TEST or RAT caption light fails to come  |
    ||           | on. Ref. Chart 101.                              |
    ||           --------------------------------------------------
*****************************************************
* On CONTROL RAT panel, place switch in TEST        *
* position and hold briefly. TEST caption light     *
* comes on and remains on as long as switch is held *
* in TEST position. If :                            *
*****************************************************
    ||  |        --------------------------------------------------
    OK  NOT OK----| TEST caption light fails to come on during      |
    ||  |        | TEST. Ref. Chart 102.                            |
    ||  |        --------------------------------------------------
    ||  |        --------------------------------------------------
    ||  NOT OK----| TEST caption light stays illuminated after      |
    ||           | test. Replace module M767 [7].                   |
    ||           --------------------------------------------------
*****************************************************
* Place RH switch in TEST position and hold briefly.*
* TEST caption light comes on and remains on as     *
* long as switch is held in TEST position. If :     *
*****************************************************
    ||  |        --------------------------------------------------
    OK  NOT OK----| TEST caption light fails to come on during      |
    ||           | test. Replace cartridge M767 [10].               |
    ||           --------------------------------------------------
```

```
****************************************************
* Open Ram Air Turbine doors with tool P/N         *
* E920151000. RAT caption light comes on. If :     *
****************************************************
    ||  |            ------------------------------------------------
    OK  NOT OK----| RAT caption light fails to come on.           |
    ||              | Ref. Chart 103.                                |
    ||               ------------------------------------------------
****************************************************
* Close Ram Air Turbine doors. RAT caption light   *
* goes off.                                         *
****************************************************
    ||  |            ------------------------------------------------
    OK  NOT OK----| Caption light stays illuminated. Check        |
    ||              | condition and adjustment of microswitch M770  |
    ||              | [8].                                          |
    ||               ------------------------------------------------
****************************************************
* RAT warning circuit is operational.              *
* De-energize the aircraft electrical network and  *
* disconnect electrical ground power unit.         *
* (Ref. 24-41-00, Servicing).                      *
* Remove safety barriers.                          *
****************************************************
```

EITHER "TEST OR RAT" CAPTION LIGHT FAILS TO COME ON.

GROUND EQUIPMENT REQUIRED	
DESCRIPTION	PART NO
MULTIMETER	

Check circuit breaker associated with extinguished caption light :
TEST caption light - circuit breaker M761, panel 1-213, map ref. R17
RAT caption light - circuit breaker M762, panel 3-213, map ref. B10

OK → Replace faulty caption light - TEST M765 [3] or RAT M766 [4].

NOT OK → Replace circuit breaker M761 [1] or M762 [2].

Chart 101

```
*************************************
* "TEST" CAPTION LIGHT FAILS TO COME *
* ON DURING TEST.                   *
*************************************


*****************************************************
* On Flight Engineer's CONTROL RAT panel, place RH  *
* switch in TEST position, and hold briefly. TEST   *
* caption light comes on.                           *
*****************************************************
        |                                  |
        |                                  |
        OK                              NOT OK
        |                                  |
        |                                  |
--------------------------------  --------------------------------
| Replace cartridge M768 [9].  |  | Replace module M767 [7].     |
--------------------------------  --------------------------------
```

Chart 102

"RAT" CAPTION LIGHT FAILS TO COME ON.

GROUND EQUIPMENT REQUIRED	
DESCRIPTION	PART NO
MULTIMETER	

On panel 3-213, map ref. B10, trip circuit breaker M762 [2].
Disconnect plug from microswitch M770 [8], zone 551.
Check continuity across terminals A and C of microswitch.

- OK: Replace RAT caption light M766 [8].
- NOT OK: Replace microswitch M770 [8].

Chart 103

ITEM No. AND DESCRIPTION	ACCESS PANEL	PANEL/ ZONE	EQUIP. IDENT.	POSITION	MANUAL REF. MAINT. TOPIC	MANUAL REF. WIRING DIAGRAM
[1] Circuit breaker 28 VDC		1-213	M761	R17	24-50-00 R/I	29-24-01
[2] Circuit breaker 28 VDC		3-213	M762	B10	24-50-00 R/I	29-24-01
[3] Caption light - ram air rlse cart test		14-214	M765	Flight Engineer's Panel	29-00-00 R/I	29-24-01
[4] Caption light - ram air turbine door		14-214	M766	Flight Engineer's Panel	29-00-00 R/I	29-24-01
[5] Switch - uplock rlse cart 1 cont		14-214	M763	Flight Engineer's Panel	29-00-00 R/I	29-24-01
[6] Switch - uplock rlse cart 2 cont		14-214	M764	Flight Engineer's Panel	29-00-00 R/I	29-24-01
[7] Module - uplock rlse cart test		14-214	M767	Flight Engineer's Panel	29-00-00 R/I	29-24-01
[8] Micro-switch - ram air turbine door	GB-FB	551	M770			29-24-01
[9] Cartridge 1 - Uplock rlse	GB-FB	551	M768		29-24-16 R/I	29-24-01
[10] Cartridge 2 - uplock rlse	GB-FB	551	M769		29-24-16 R/I	29-24-01

Component Identification
Table 101

RAM AIR TUBRINE - ADJUSTMENT/TEST

1. General

This topic describes the procedure for testing the electrical circuit controlling extension of the ram air turbine (RAT).

2. Operational Test

A. Equipment and Materials

DESCRIPTION	PART NO.
R R Rigging Pin - Ram Air Turbine	E930052000
Electrical Ground Power Unit	
R R External Power	24-41-00, S

B. Prepare

(1) Make certain that the following circuit breakers are set :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
RAT TEST No.1 CART SUP	1-213	M 761	R17
RAT IND No.2 CART SUP	3-213	M 762	B10
ROOF PNL LT TEST SUP	15-216	L1002	D13

R (2) Trip, safety and tag the following circuit breaker :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
STATIC INV SUP	1-213	X 138	N10

(3) Connect electrical ground power unit and energize the
R aircraft electrical network (Ref. 24-41-00, Servicing).

R (4) Make certain that RAT rigging pin E930052000 is not

in position.

(5) Position safety barriers around RAT extension area.

C. Test

R (1) On CONTROL RAT unit of Flight Engineer's panel, make certain that the guards preventing the two ON-OFF-TEST switches from being moved accidentally to the ON position, are sealed.

R (2) On unit (12-214) on Flight Engineer's panel, briefly
R hold LIGHTS FWD switch in test position.
R - On CONTROL RAT unit of Flight Engineer's panel, the
R caption lights must come on and remain on until
R LIGHTS FWD switch is released.

R (3) On CONTROL RAT unit of Flight Engineer's panel

(a) Place LH ON-OFF-TEST switch in TEST position, and hold briefly.
- TEST caption light must come on and remain on until switch is released from TEST position.

(b) Place RH ON-OFF-TEST switch in TEST position, and hold briefly.
- TEST caption light must come on and remain on until switch is released from TEST position.

D. Close Up

(1) De-energize the aircraft electrical network and discon-
R nect electrical ground power unit (Ref. 24-41-00,
R Servicing).

R (2) Install RAT rigging pin E930052000.

(3) Remove safety barriers.

(4) Remove safety tag and clip, and reset circuit breaker.

EJECTION JACK - SERVICING

1. General

This topic describes the procedure for filling and bleeding the
R ram air turbine (RAT) ejection jack, when it is installed on the aircraft.

2. Filling and Bleeding

A. Equipment and Materials

DESCRIPTION	PART NO.
Ground Power Unit - Hydraulic - Power and Preliminary Testing	EMH398E
NATO Air/Hydraulic Tool Kit	
R Rigging Pin - Ram Air Turbine	E930052000
Hydraulic Fluid (Ref. 20-30-00, No.011)	
Access Platform - 3.160 m (10 ft. 4 in.)	

B. Prepare

(1) Position access platform.

R (2) Check that RAT rigging pin E930052000 is installed.

(3) Remove fairing 551BB.

C. Fill

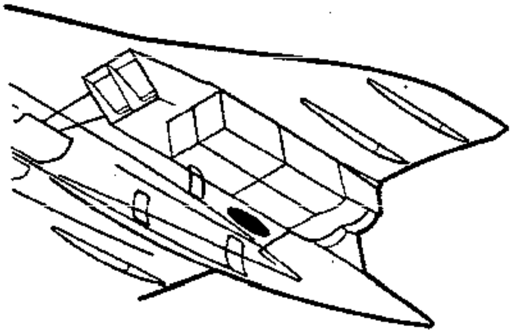
CAUTION : WHEN THE EJECTION JACK IS FILLED ON THE AIRCRAFT, THE RAT LEG MUST BE IN THE RAM AIR TURBINE BAY, SINCE THE JACK ROD IS EXTENDED.

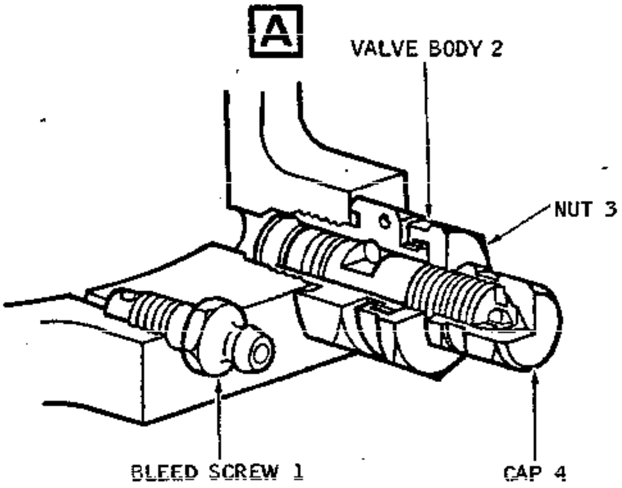
(1) Remove cap (4) from jack filler valve. Connect hydraulic supply hose to valve.

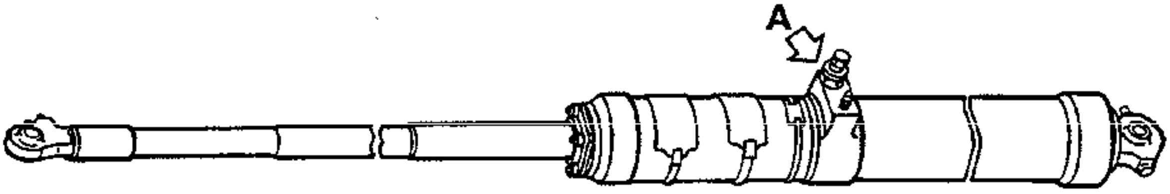
(2) Loosen nut (3) on filler valve, to open valve.

NOTE : Do not fit wrench on valve body hexagon when loosening nut.

R (3) Unscrew jack bleed screw (1) a few turns only.







CMA 29 24 12 3 AAM0

Filling of Ejection Jack
Figure 301

(4) Operate hydraulic ground power unit, so that hydraulic
R fluid No.011 is supplied slowly. Allow any air in the
R fluid to discharge through bleed screw. Continue until fluid reaches level of bleed screw.

(5) Tighten bleed screw (1), tighten nut (3) and torque to between 5.6 and 8.0 mN (50 and 70 lbf.in.).

NOTE : Do not fit wrench on valve body hexagon when tightening nut.

(6) Disconnect hydraulic supply hose and install jack filler valve cap (4). Torque to 3.4 mN (30 lbf.in.).

D. Close-Up

(1) Clean the ejection jack and adjacent area, and make certain that no trace of hydraulic fluid remains.

R (2) Make certain that working area is clear of tools and miscellaneous items of equipment.

(3) Install fairing 551BB.

R (4) Remove RAT rigging pin E930052000.

(5) Install guard of aperture 551QB.

(6) Remove all ground handling and maintenance equipment, standard and special tools, together with ground power and replenishing equipment, all access equipment and miscellaneous items.

EJECTION JACK - REMOVAL/INSTALLATION

1. General

The ejection jack extends the ram air turbine (RAT) into its operating position.

2. Ejection Jack

A. Equipment and Materials

DESCRIPTION	PART NO.
Rigging Pin - Ram Air Turbine	E930052000
Stowing Tool - Ram Air Turbine	E920135000
Corrosion Resistant Steel Lockwire, Dia. 1 mm (0.041)	
Device - Ram Air Turbine Access	E920151000
Special Materials (Ref. 20-30-00, No.115)	
Access Platform - 3.16 m (10 ft. 4 in.)	
Hydraulic Fluid (Ref. 20-30-00, No.011)	
Slip Gauge (Johansson Type Block), 0.062 in. (1.57 mm)	
R R Tool Kit - Nose Landing Gear - Water Deflector	D921627000

B. Prepare

(1) Remove RAT rigging pin E930052000.

(2) Manually extend RAT (Ref. 29-24-13, Servicing).

(3) Remove fairing BB, zone 551.

C. Remove

(1) Remove nut (5), washers (2), shouldered bush (4) and clevis bolt (3) attaching jack piston rod to leg operating rod fork end.

R R R R (2) Using special extractor, remove spring lock washer (12); using special torque adapter, remove slotted nut (11); remove cup washer (10) and pin (8) securing jack to structure.

(3) Remove jack (6).

D. Preparation of Replacement Component

CAUTION : THE EJECTION JACK SHALL HAVE BEEN FILLED WITH HYDRAULIC FLUID PRIOR TO INSTALLATION.
SHOULD JACK NEED TO BE FILLED OR TOPPED UP WHEN INSTALLED ON AIRCRAFT, REFER TO 29-24-12, SERVICING.

E. Installation

(1) Make certain that shouldered bush (9) and ring (7) are present on structure fork end, and position ejection jack in its recess.

R R R R R R (2) Connect jack to structure by means of pin (8), cup washer (10), slotted nut (11) using special torque adapter. Dry torque to between 35 and 45 m.N (25.814 and 33.19 lbf.ft.).
Using special inserter, install spring lock washer (12).

NOTE : Apply a light coating of product No.115 to pin (8).

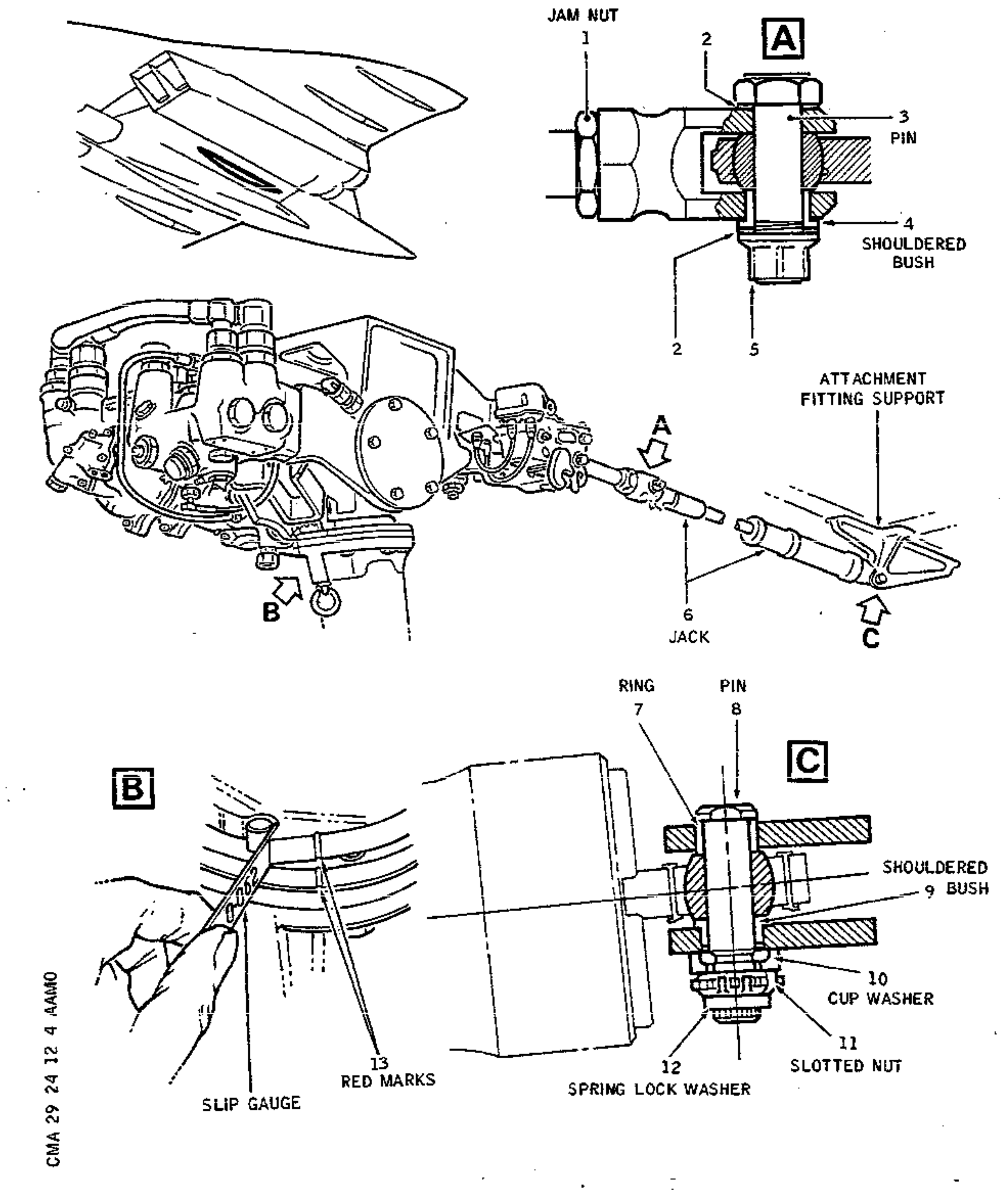
(3) Install pin (3), shouldered bush (4) and washers (2) securing jack piston rod to RAT leg operating rod fork end.

(4) Check RAT leg extension :

The red marks (13) on the RAT leg axle and on the gear segment must be opposite each other. If adjustment is necessary, the precise position is obtained by inserting a 0.062 in (1.57 mm) slip gauge between the downlock pin and the axle stop face, then adjust the operating rod as follows :

(a) Remove pin (3) and bush (4).

(b) Loosen jam nut (1) and adjust position of fork end on operating rod in order to increase or reduce effective length of rod until red marks (13) are aligned.



Ejection Jack
Figure 401

R

NOTE : After adjustment, the fork end must be in its original radial position, or at 180° from it, i.e. the clevis bolt must be horizontal. One half turn of the fork end corresponds to a difference of approximately half a degree between the locating marks.

(c) Tighten fork end jam nut (1) and wirelock.

(5) Position piston rod eye end fitting in fork end and install pin (3) fitted with washer (2), bush (4), washer (2) and nut (5) to attach jack rod to RAT leg operating rod. Lubricate threads of clevis bolt with product No.11. Torque nut (5) to between 40 and 47 m.N (30 and 35 lbf.ft.).

NOTE : The piston rod eye end fitting must remain in its original position, with lubricating nipple lowermost.

F. Test

After SB 29-024 For A/C 001-004,

(1) Adjust blade stowage guide stop (Ref. 29-24-16, Adjustment/Test).

**ON A/C 001-004,

(1) Not applicable.

(2) Carry out an extension and stowage test for RAT (Ref. 29-24-13, Servicing).

G. Close-Up

(1) Re-install fairing BB, zone 551.

(2) Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(3) Stow RAT using tool P/N E920135000 (Ref. 29-24-13, Servicing). Remove tool.

(4) Close doors GB and FB using tool P/N E920151000. Remove tool.

(5) Install RAT rigging pin E930052000.

(6) Remove access platforms.

After SB 29-024 For A/C 001-004,

3. Blade Stowage Guide Stop

A. Equipment and Materials

DESCRIPTION	PART NO.
Stowing Tool - Ram Air Turbine	E920135000
Device - Ram Air Turbine Access	E920151000
Rigging Pin - Ram Air Turbine	E930052000
Access Platform, 3.160 m (10 ft. 4 in.)	
Corrosion Resistant Steel Lockwire Dia. 0.028 in. (0.7 mm)	

B. Prepare

(1) Manually extend ram air turbine (RAT) (Ref. 29-24-13, Servicing).

C. Remove

(1) Loosely secure clamp (1) and stop carrier (3) around ejection jack piston rod with the two D headed bolts (2) and self-locking nuts (4).

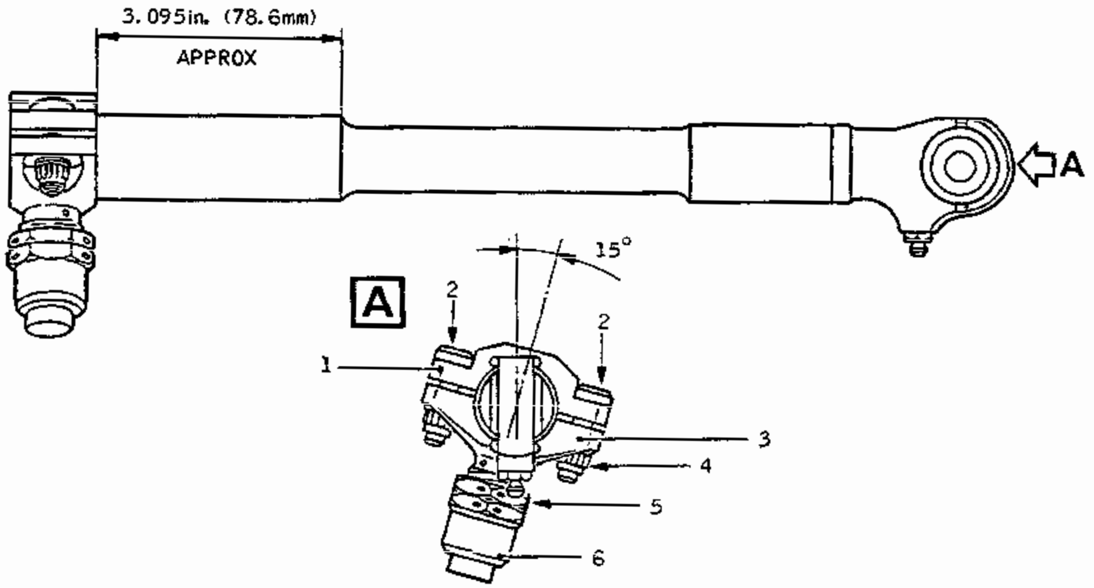
(2) Position assembly on piston rod at dimension and angle shown, then torque self-locking nuts (4) to between 45 and 50 lbf.in. (5.1 and 5.6 Nm).

(3) Screw locknut (5) followed by subassembly of stop (6) fully down on externally threaded stop carrier.

NOTE : Do not tighten or wirelock at this stage.

D. Adjustment/Test

Adjust blade stowage guide stop (Ref. 29-24-13, Adjustment/Test).
After adjustment has been completed, wirelock stop and locknut (Ref. 20-21-13).



CMA 29 24 12 4 ACMO

Installing Stop on Ejection Jack
Figure 402

E. Close-Up

(1) Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(2) Using tool E920135000, stow RAT (Ref. 29-24-13, Servicing). Remove tool.

(3) Using tool E920151000, close doors GB and FB (Ref. 29-24-13, Servicing). Remove tool.

(4) Install rigging pin E930052000.

(5) Remove access platforms.

RAM AIR TURBINE - SERVICING

WARNING : MAKE CERTAIN THAT THE POSITIONS OF NOSE AND MAIN GEAR DOORS CORRESPOND WITH THE ACTUAL POSITIONS OF THE RESPECTIVE OPERATING HANDLES.
HANDLE LOCKED, INDICATOR PLATE SHOWING WHITE : DOORS CLOSED.
HANDLE LOCKED, INDICATOR PLATE SHOWING RED : DOORS OPEN.

MAKE CERTAIN THAT THE LANDING GEAR POSITION INDICATED ON THE GEARS POSITION INDICATING UNIT CORRESPONDS WITH THE ACTUAL POSITION OF THE LANDING GEAR.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE, MAKE CERTAIN THAT THE TRAVEL RANGES OF THE CONTROL SURFACES ARE CLEAR.

BEFORE PRESSURIZING HYDRAULIC SYSTEMS, CHECK THAT ALL CONTROLS ARE SET TO CORRESPOND WITH THE ACTUAL POSITION OF THE SERVICES THEY OPERATE.

MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

1. General

This topic sets out the procedure for servicing the ram air turbine (RAT), and for replacing the RAT valve module filter elements.

Whenever the aircraft is on the ground for any length of time, the uplock release cartridge electrical connectors must be disconnected.

2. Ram Air Turbine (RAT) - Extension and Stowing

A. Equipment and Materials

DESCRIPTION	PART NO.
Device - Ram Air Turbine Access	E920151000
Rigging Pin - Ram Air Turbine	E930052000
Stowing Tool - RAT	E920135000
Access Platform - 3.160 metres (10 ft. 4 in.)	

DESCRIPTION	PART NO.
Electrical Ground Power Unit	
Warning Notice	
Safety Clips	

B. Prepare

WARNING : DISPLAY A WARNING NOTICE AT FLIGHT ENGINEER'S STATION PROHIBITING OPERATION OF RAM AIR TURBINE UPLOCK RELEASE CARTRIDGE CONTROL SWITCHES.

(1) Remove cover from opening 551PB for access to uplock unit.

R (2) Remove rigging pin E930052000.

(3) Trip,safety and tag the following circuit breaker :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
RAT TEST No.1 CART SUP	1-213	M761	R17

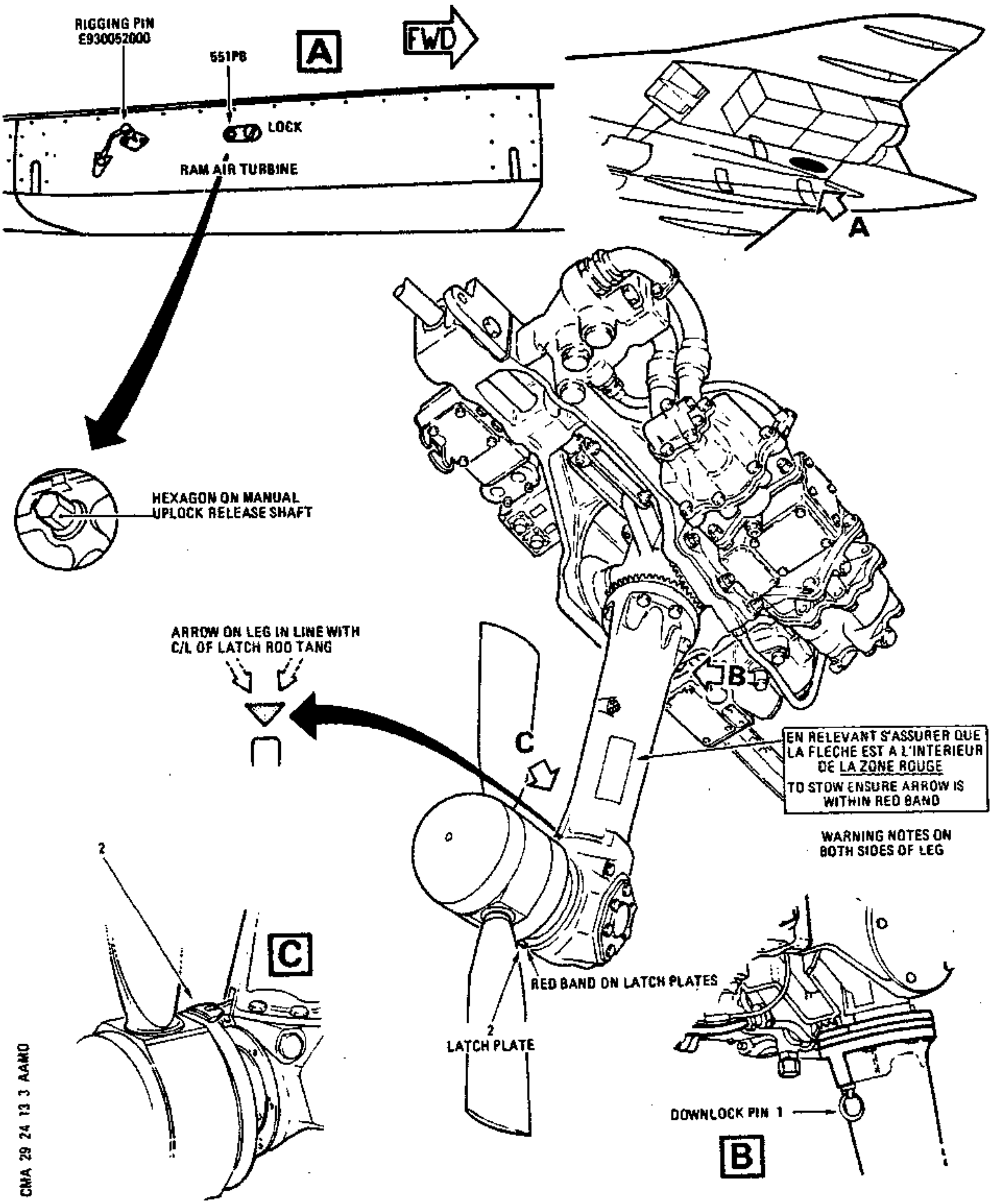
(4) Make certain that the following circuit breaker is set :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
RAT IND No.2 CART SUP	3-213	M 762	B10

(5) Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing).

C. Manually Extend Ram Air Turbine

WARNING : THE TRAVEL RANGES OF THE RAM AIR TURBINES DOORS AND LEG MUST BE CLEAR OF ALL PERSONNEL AND EQUIPMENT.
R B IF A TURBINE BLADE IS FOUND BENT THE RAT MUST BE
R B REPLACED.



Ram Air Turbine
Figure 301

R

(1) Through opening 551 PB, rotate hexagon of manual release shaft in a clockwise direction in order to eject RAT.
Torque required must not exceed 3.4 Nm (30 lbf. in).

(2) Check that RAT downward movement is damped towards end of travel .

(3) Make certain that downlock pin (1) on rear of RAT leg locks leg in extended position.

(4) On CONTROL RAT section of Flight Engineer's panel, check that "RAT" caption light is illuminated.

(5) Check that turbine hub is unlocked and free to rotate.

(6) Trip, safety and tag circuit breaker M762, panel 3-213, map. ref. B10.

(7) Carry out appropriate tests.

PRINTED IN ENGLAND

D. Stow Ram Air Turbine

R WARNING: FOLLOWING A RELEASE BY A CARTRIDGE FIRING, REMOVE
R OR REPLACE CARTRIDGE(S) TO ALLOW CORRECT OPERATION
R OF UPLOCK MECHANISM.

(1) Install tool P/N E920135000 on RAT leg.

CAUTION: BEFORE RETRACTING RAT LEG, MAKE CERTAIN THAT STOWAGE BAY IS CLEAR OF ALL SERVICING EQUIPMENT, TOOLS, ETC.

**ON A/C 001-004,

(2) Rotate turbine hub to position blades vertically, with latch plate (2) at the top, adjacent to the latch rod.

**ON A/C 005-007

(2) Rotate turbine hub to position blades vertically, so that red arrow on RAT leg is centred on red band of latch plate (2).

**ON A/C ALL

(3) Remove downlock pin (1) securing leg in extended position, and swing RAT leg forward, making certain that latch rod tang engages in latch plate (2).

CAUTION: THE BLADE LOCKING OPERATION REQUIRES A DOUBLE INSPECTION.

(4) Push leg upwards until leg uplock roller engages in uplock unit hook.

NOTE: Two men are required to retract the RAT.

(5) Through opening 551QB, insert ram air turbine rigging pin E930052000.

WARNING : MAKE CERTAIN THAT WARNING STREAMER OR SIMILAR SIGNAL ON UPLOCK PIN IS CONSPICUOUSLY DISPLAYED.

(6) Remove tool E920135000.

CAUTION : BEFORE CLOSING STOWAGE BAY DOORS CHECK CORRECT BLADE LOCKING BY SUCCESSIVE DOUBLE INSPECTION.

(7) Remove safety clips and tags, and re-set circuit breaker M761, panel 3-213, map. ref. B10.

(8) Close stowage bay doors with tool P/N E920151000, and check that "RAT" caption light on Flight Engineer's panel is extinguished.

(9) Remove tool P/N E920151000.

E. Close-Up

(1) Install cover over opening 551PB.

(2) De-energize aircraft electrical network and disconnect electrical ground power unit (Ref. 24-41-00, S).

(3) Remove warning notice.

(4) Remove safety clip and reset circuit breaker M761, panel 1-213, map ref. R17.

(5) Remove access platforms.

3. Filter Elements - Replacement
(Ref. Fig. 302)

The following procedure applies to the filters in both valve modules.

A. Equipment and Materials

DESCRIPTION	PART NO.
Device - Ram Air Turbine Access	E920151000
Stowing Tool - RAT	E920135000
Rigging Pin - Ram Air Turbine	E930052000
Ground Power Unit - Hydraulic - Power and Preliminary Testing	EMH398E
Access Platform, 3.160 m (10 ft. 4 in.)	
Container for Recovery of Hydraulic Fluid	
Corrosion-Resistant Steel Lockwire, dia. 1 mm (0.041 in.)	
Hydraulic Fluid (Ref. 20-30-00, No.011)	
Circuit Breaker Safety Clip	

B. Prepare

(1) Take the precautions described in the previous WARNING paragraph.

(2) Remove rigging pin E930052000.

(3) Manually extend RAT (Ref. paragraph 2).

(4) Open access door 151DB and depressurize Green and Yellow hydraulic systems.

WARNING : DISPLAY WARNING NOTICES ON ENGINES 1, 2 AND 3 PROHIBITING PRESSURIZATION OF BLUE, GREEN AND YELLOW HYDRAULIC SYSTEMS BY HYDRAULIC GROUND POWER UNIT.

DISPLAY A WARNING NOTICE AT FLIGHT ENGINEER'S

STATION PROHIBITING USE OF GROUND PRESSURIZING SYSTEM ELECTRIC PUMPS.

IF A HYDRAULIC GROUND POWER UNIT IS CONNECTED DISPLAY A WARNING NOTICE ON IT PROHIBITING AIRCRAFT HYDRAULIC SYSTEM PRESSURIZATION.

(5) Trip, safety and tag the following circuit breaker :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
HYD GRND CHECK OUT SEL VALVE CONT	15-216	M 626	F22

(6) Open access door 153BB, and depressurize Green and Yellow system tanks.

(7) Close tank depressurization valves and secure with safety pins.

C. Remove

CAUTION : POSITION CONTAINER FOR RECOVERY OF HYDRAULIC FLUID.

(1) Cut and remove lockwire and remove filter plug (6).

(2) Remove filter element (3) from plug, and remove shims (4).

(3) Remove sealing ring (5) from plug.

D. Preparation of Replacement Component

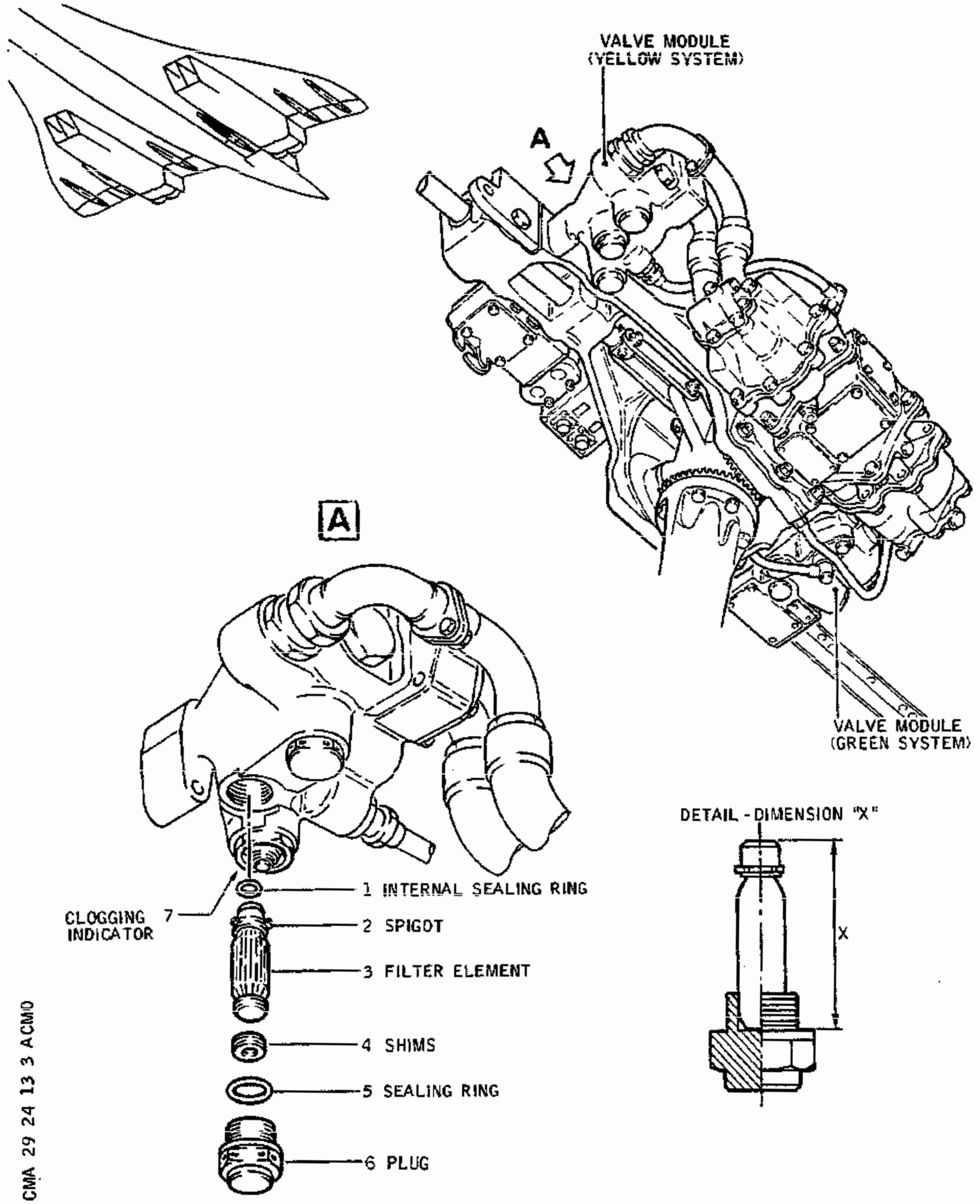
(1) Adjust thickness of shims as follows :

(a) Insert a new filter element in plug, without fitting sealing ring (5) or shims (4).

(b) Make certain that element abuts against plug inner face.
Measure dimension "X", between top end of filter element and plug abutment face.
Prepare shims of sufficient thickness to bring dimension "X" to between 31.75 mm (1.250 in.) and 31.88 mm (1.255 in.) when assembled in plug.

(2) Remove filter element from plug.

Printed in England



Filter Element
Figure 302

E. Install

(1) Install a new internal sealing ring (1) on filter element, and insert element in module body, making certain that spigots engage in filter adapter.

(2) Install a new sealing ring (5) on plug, and install shims (4) in plug.
Lubricate plug threads with Product No.011.

(3) Screw plug into valve module and tighten. Torque to between 11 and 13.5 Nm (8 and 10 lbf.ft.). Then wirelock.

(4) Reset clogging indicator (2) by pressing in the plunger.

(5) Remove safety clip and tag, and reset circuit breaker M626.

(6) Remove warning notices.

(7) Pressurize Green system (Ref. 29-11-00, Servicing) or Yellow system (Ref. 29-21-00, Servicing) as appropriate for valve module concerned. Bleed RAT hydraulic system by loosening HP union (pump delivery) on relevant module. Re-tighten union and wirelock.

(8) Discontinue pressurizing Green system (Ref. 29-11-00, Servicing) or Yellow system (Ref. 29-21-00, Servicing).

F. Test

Carry out a functional test of RAT (Ref. 29-24-13, Adjustment/Test) and check for hydraulic fluid leakage.

G. Close-Up

(1) Make certain that working area is clear of tools and miscellaneous items of equipment.

(2) Clean adjacent area and make certain that no trace of hydraulic fluid remains.

(3) Stow RAT (Ref. paragraph 2).

(4) Install rigging pin E930052000.

(5) Disconnect and remove hydraulic ground power unit.

(6) Remove access platform.

RAM AIR TURBINE - REMOVAL/INSTALLATION

WARNING: MAKE CERTAIN THAT THE POSITIONS OF NOSE AND MAIN GEAR DOORS CORRESPOND WITH THE ACTUAL POSITIONS OF THE RESPECTIVE OPERATING HANDLES.
HANDLE LOCKED, INDICATOR PLATE SHOWING WHITE: DOORS CLOSED.
HANDLE LOCKED, INDICATOR PLATE SHOWING RED: DOORS OPEN.

MAKE CERTAIN THAT THE LANDING GEAR POSITION INDICATED ON THE GEARS POSITION INDICATING UNIT CORRESPONDS WITH THE ACTUAL POSITION OF THE LANDING GEAR.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE MAKE CERTAIN THAT THE TRAVEL RANGES OF THE CONTROL SURFACES ARE CLEAR.

BEFORE PRESSURIZING HYDRAULIC SYSTEMS, CHECK THAT ALL CONTROLS ARE SET TO CORRESPOND WITH THE ACTUAL POSITION OF THE SERVICES THEY OPERATE.

MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

PRINTED IN ENGLAND

1. General

The ram air turbine (RAT) is an emergency power source which operates in the event of failure of the normal source.

2. Ram Air Turbine

A. Equipment and Materials

DESCRIPTION	PART NO.
Rigging Pin - Ram Air Turbine	E930052000
Equipment - Ram Air Turbine Removal/Installation	E930005000
Stowing Tool - Ram Air Turbine	E920135000
Device - Ram Air Turbine - Access	E920151000
Access Platform - 10 ft 4 in (3.16 metres)	-
Hydraulic Fluid (Ref. 20-30-00, No.011)	-

DESCRIPTION	PART NO.
Circuit Breaker Safety Clips	-
Tool Kit - Nose Landing Gear - Water Deflector	D921627000

B. Prepare

(1) Take the precautions described in the previous WARNING paragraph.

(2) Trip, safety and tag the following circuit breakers:

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
RAT TEST No.1 CART SUP	1-213	M 761	R17
RAT IND No.2 CART SUP	3-213	M 762	B10
HYD TANK COMPR CONT	12-215	M 602	D 8
HYD GRND CHECK OUT SEL VALVE CONT	15-216	M 626	F22

(3) Depressurize Green and Yellow hydraulic systems.

WARNING: DISPLAY WARNING NOTICES ON ENGINES 1, 2 AND 3 PROHIBITING PRESSURIZATION OF BLUE, GREEN AND YELLOW HYDRAULIC SYSTEMS BY HYDRAULIC GROUND POWER UNIT.

DISPLAY A WARNING NOTICE AT FLIGHT ENGINEER'S STATION PROHIBITING USE OF GROUND PRESSURIZING SYSTEM ELECTRIC PUMPS.

(4) Depressurize Green and Yellow system hydraulic tanks (Ref. 29-13-00, Servicing).

(5) Close tank depressurization valves, and secure with safety pins.

(6) Remove rigging pin E930052000 from RAT.

(7) Manually eject RAT (Ref. 29-24-13, Servicing).

PRINTED IN ENGLAND

(8) Remove ejection jack (Ref. 29-24-12, Removal/Installation).

C. Remove

(1) Remove fairings GB and FB in zone 551.

(2) Disconnect aircraft system HP and LP hydraulic lines and cap open line ends.

(3) Disconnect uplock release cartridge electrical firing
B circuit plugs (8). Remove and retain three bolts securing
B the loom and socket bracket, ensure the bracket clears the
B RAT when it is lowered.

(4) Position trolley P/N E930005000 and attach RAT with clamps.

(5) Remove and retain nuts (2) and bushes (1).

(6) Using special extractor, remove spring lock washer (5). Using special torque adapter, remove slotted nut (6). Remove bolt (4) and remove RAT using hoisting system on trolley.

D. Preparation of Replacement Component

(1) Depreserve component. If blade stowage guide stops are installed, screw fully down on to carrier.

(2) Install RAT on trolley.

E. Install

(1) Position RAT in stowage bay, using hoisting system on trolley.

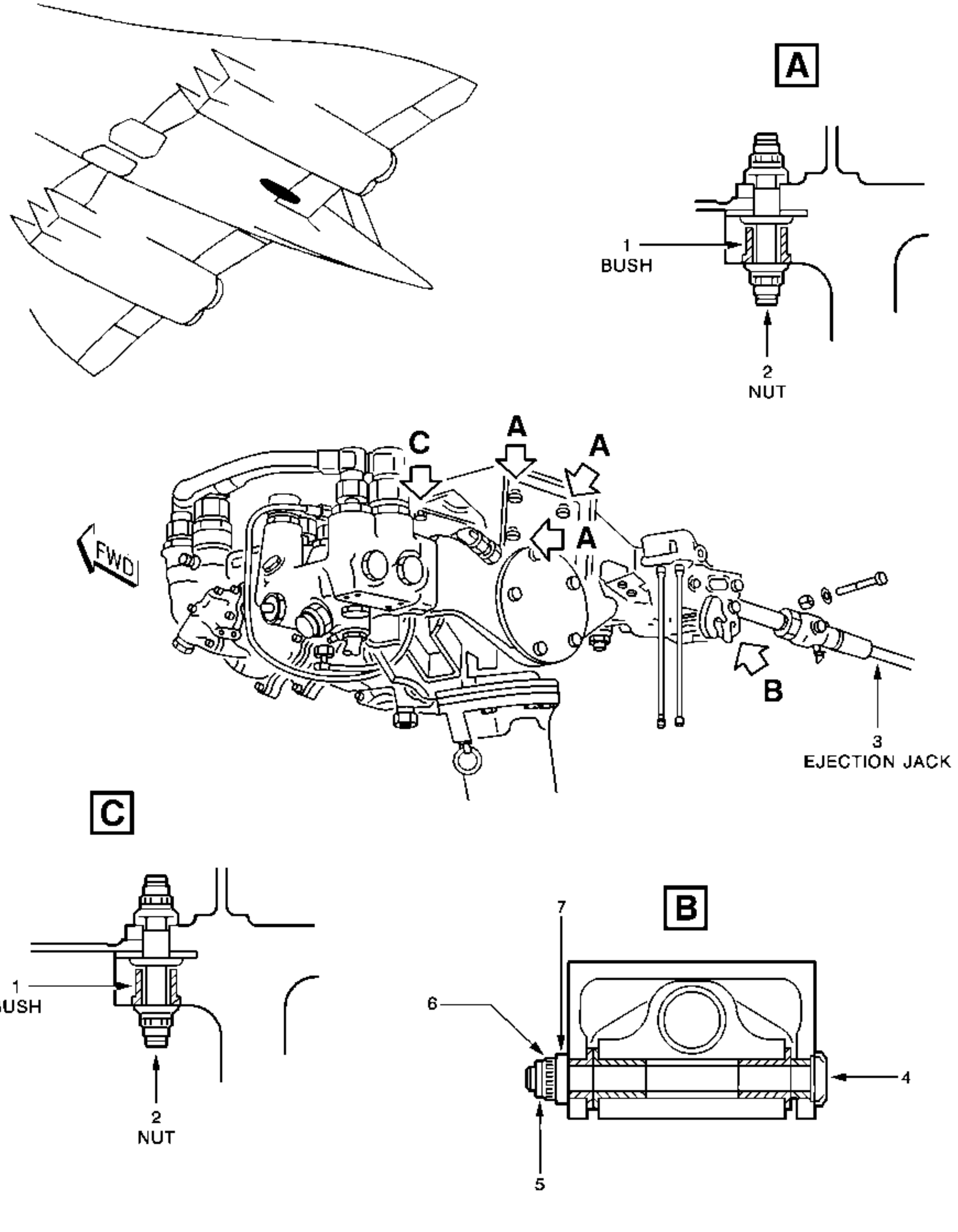
(2) Install bushes (1) ensuring that master stud fitted with unique close tolerance item, loosely apply attachment nuts (2).

(3) Install bolt (4), washer (7), slotted nut (6). Using special torque adapter dry torque to between 44.24 and 88.47 lbf in (0.5 and 1.0 mdaN). Using special inserter, fit spring lock washer (5).

RB NOTE: Ensure plain bush is installed under head of
RB bolt (4).

(4) Torque-tighten attachment nuts (2) (Ref. 20-21-11).

(5) Remove attachment clamps and remove trolley.



CMB 29 24 13 4 AAM0 00

RB

Ram Air Turbine
Figure 401

PRINTED IN ENGLAND

(6) Remove caps from hydraulic lines. Connect lines. Install
B loom and socket bracket and connect electrical connectors (8).

(7) Install ejection jack (Ref. 29-24-12, Removal/Installation).

(8) Remove safety clips and tags and reset circuit breakers.

(9) Remove warning notices.

F. Test

(1) Extend and stow RAT (Ref. 29-24-12, Servicing).

(2) Adjust uplock pin if necessary (Ref. 29-24-16, Adjustment/Test), and blade stowage guide stops, if installed (Ref. 29-24-13, Adjustment/Test).

(3) Pressurize hydraulic tanks (Ref. 29-13-00, Servicing).

(4) Bleed Yellow and Green system pumps in RAT through delivery lines.

(5) Carry out functional tests of RAT (Ref. 29-24-13, Adjustment/Test) and make certain that there is no hydraulic fluid leakage.

(6) Check that clogging indicator of each filter is not protruding (Ref. 29-00-00, Inspection/Check).

G. Close-Up

(1) Install fairings GB and FB in zone 551, and cover over opening PB in fairing GB, zone 551.

(2) Clean the area adjacent to the RAT and make certain that no trace of hydraulic fluid remains.

(3) Make certain that working area is clear of tools and miscellaneous items of equipment.

(4) Stow RAT (Ref. 29-24-13, Servicing).

(5) Install RAT rigging pin E930052000.

(6) Remove access platforms.

PRINTED IN ENGLAND

RAM AIR TURBINE - ADJUSTMENT/TEST

WARNING : MAKE CERTAIN THAT THE POSITIONS OF NOSE AND MAIN GEAR DOORS CORRESPOND WITH THE ACTUAL POSITIONS OF THE RESPECTIVE OPERATING HANDLES.
HANDLE LOCKED, INDICATOR PLATE SHOWING WHITE : DOORS CLOSED.
HANDLE LOCKED, INDICATOR PLATE SHOWING RED : DOORS OPEN.

MAKE CERTAIN THAT THE LANDING GEAR POSITION INDICATED ON THE GEARS POSITION INDICATING UNIT CORRESPONDS WITH THE ACTUAL POSITION OF THE LANDING GEAR.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE, MAKE CERTAIN THAT THE TRAVEL RANGES OF THE CONTROL SURFACES ARE CLEAR.

BEFORE PRESSURIZING HYDRAULIC SYSTEMS, CHECK THAT ALL CONTROLS ARE SET TO CORRESPOND WITH THE ACTUAL POSITION OF THE SERVICES THEY OPERATE.

MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

1. General

This topic describes the procedure for testing the ram air turbine (RAT) on the ground, and for adjusting the blade stowage guide stops.

2. Ground Test

A. Equipment and Materials

DESCRIPTION	PART NO.
Ground Power Unit - Hydraulic - Power and Preliminary Testing	EMH 398E
Rigging Pin - Ram Air Turbine	E930052000
Device - Ram Air Turbine Access	E920151000
Stowing Tool - RAT	E920135000
Motor and Adaptor Unit - Ground Check Out	GCMA1
Electrical Unit - Ground Check Out	GCEU5, CA5,

DESCRIPTION	PART NO.
	CA6
Sealant (Ref. 20-30-00, No.382)	
General Lubricants (Ref. 20-30-00, No.66)	
Cleaning Agent (Ref. 20-30-00, No.485)	
Electrical Ground Power Unit	
Access Platform - 3.160 metres (10 ft. 4 in.)	

B. Prepare

(1) Take the precautions described in the previous WARNING paragraph.

(2) Make certain that the following circuit breaker is set :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
RAT IND NO.2 CART SUP	3-213	M 762	B10

(3) Remove rigging pin E930052000 from RAT.

(4) Extend RAT (Ref. 29-24-13, Servicing).

(5) Make certain that RAT leg is in full extended position and that downlock pin is correctly engaged. Make certain that turbine latch is fully disengaged.

(6) Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing).

(7) Check that RAT caption light on panel 8-214 is illuminated.

(8) Remove the 4 nuts (2) securing end cover (1) to drive housing on RAT leg. Remove cover.

(9) Position ground check out motor and adaptor unit GCMA1 (1) to face of drive housing, locating drive shaft in quill. Secure unit with nuts.

(10) Connect hydraulic ground power unit delivery and return lines to delivery and return ports X and Y on unit GCMA1.

(11) Connect line from case drain connection (5) on motor unit GCMA1 to ground power unit return line.

(12) Remove interseal drain plug (6) from unit GCMA1, leaving port vented to ambient.

(13) Connect one end of cable assembly CA5 to receptacle on unit GCMA1, and other end to ground check out electrical unit GCEU5. Connect unit GCEU5 to electrical ground power unit with cable assembly GA6.

C. Test

WARNING : MAKE CERTAIN THAT AREA AROUND RAT IS CLEAR. PLACE SAFETY BARRIERS AROUND RAT ASSEMBLY.

(1) Pressurize hydraulic tanks to 65 psi (4.5 bars) (Ref. 29-13-00, Servicing).

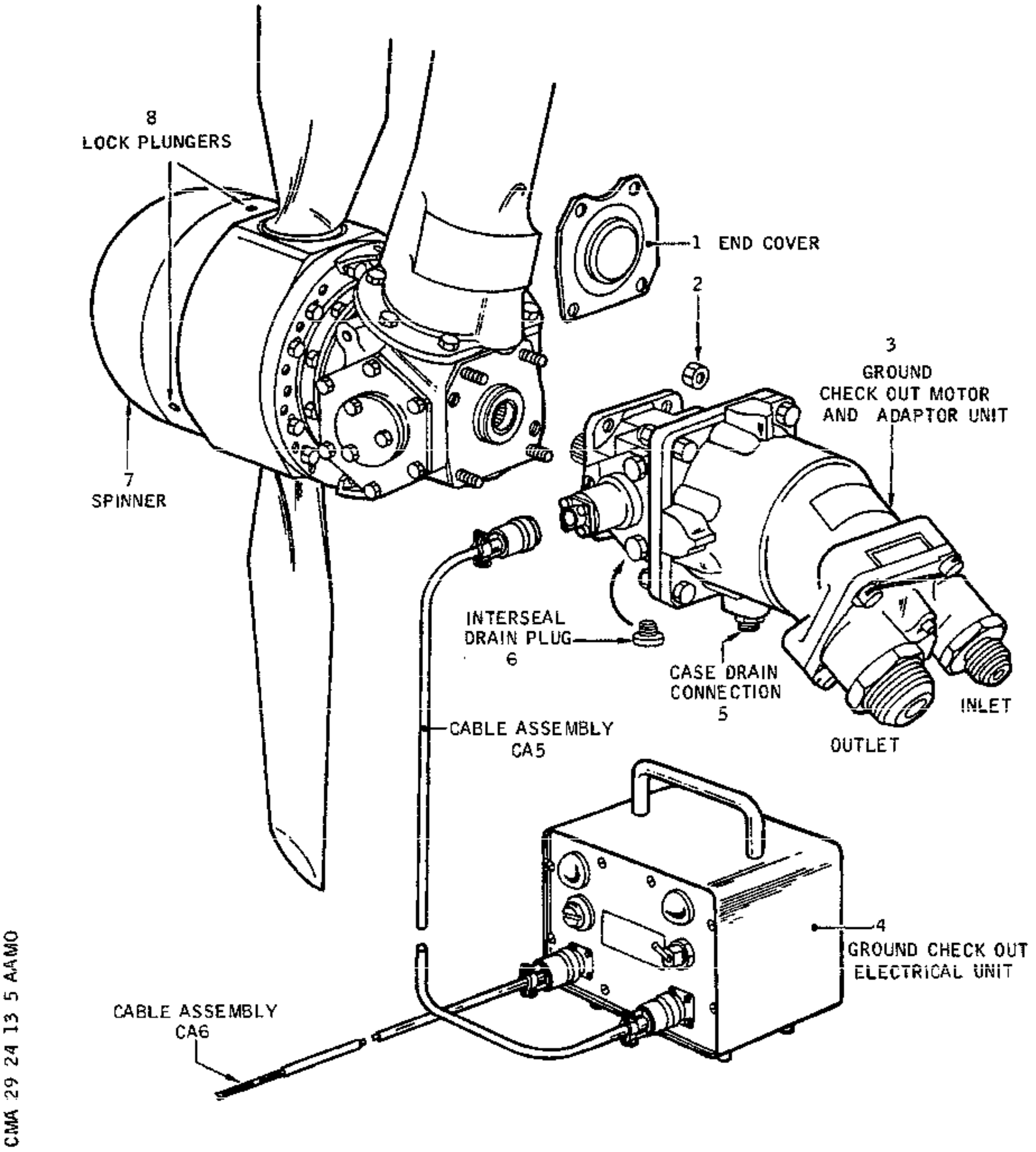
(2) Place lower servo controls selector switch on SERVO CONTROLS unit in YELLOW-BLUE position.

(3) Supply electrical power to check-out unit GCEU5. Depress switch and check that indicator lights A and B come on. Release switch.

(4) Start up hydraulic ground power unit and regulate pressure output so that RAT rotates slowly. Check that direction of rotation is correct : anti-clockwise with RAT viewed from rear.

(5) Increase hydraulic pressure to 4000 psi (275 bars), with an out flow of 35 UK gal/min. (42 US gal/min, 159 litres/min.).Indicator light A must come on. This indicates a governed speed of 5150 ± 3 % rpm. If indicator light A fails to come on, there is an underspeed condition.
If both indicator lights come on, there is an overspeed condition.

The following pressure must be obtained in the Green and Yellow systems :



R

Test of Ram Air Turbine on Ground
Figure 501

Green pressure : 3843 ± 72 psi (265 ± 5 bars)
Yellow pressure : 3336 ± 72 psi (230 ± 5 bars)

NOTE : Operate Green system continuously, as this system supplies power for regulation.

(6) Displace rudder at a relatively slow rate. Indicator light A must remain on, and indicator light B must remain extinguished.

NOTE : It is permissible for indicator light A to be extinguished, or for indicator light B to be illuminated, for a short period during operation of the service.

(7) Shut off pressure supply and shut down hydraulic ground power unit. Check that RAT blades return to coarse pitch position.

(8) Release pressure in ground power unit delivery and return lines. Disconnect lines.

(9) Remove spinner (7).

(a) Mark position of spinner with respect to hub.

(b) Press and turn the four lock plungers, remove spinner.

(c) Examine mechanism for any leakage.

(10) Install spinner (7) on turbine.

(a) Apply product No.382 to mating surfaces of hub and spinner.

(b) Using a mixture of one part Product No.66 to nine parts Product No.485, apply a brush coat to the front of the hub, the spring housing and the inside of the spinner (except for those surfaces covered twith Product No.382).

(c) With the four lock plungers in unlocked position, fit spinner on hub and align locating marks. Turn each plunger to locked position.

(11) Depress switch on ground check out electrical unit GCEU5 and check that both indicator lights come on. Release switch.

(12) De-energize aircraft electrical network, disconnect

cable assemblies CA5 and CA6.

(13) Install interseal drain plug (6), disconnect case drain line (5).

(14) Remove nuts (2) and ground check out motor and adaptor unit GCMA1 (3).

(15) Install end cover (1) on drive housing. Install and tighten nuts (2). Torque to 15.8 lbf.ft. (21 mN). Wirelock.

(16) Retract RAT (Ref. 29-24-13, Servicing).

(17) Install rigging pin E930052000.

D. Close-Up

(1) Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(2) Remove access platform.

(3) Disconnect and remove electrical ground power unit.

(4) Remove hydraulic ground power unit.

After SB 29-024 For A/C 001-004,

3. Adjustment of RAT Blade Stowage Guide Stops

A. Equipment and Materials

DESCRIPTION	PART NO.
Stowing Tool - RAT	E920135000
Corrosion Resistant Steel Lockwire, Dia. 0.028 in. (0.7 mm)	
Circuit Breaker Safety Clips	
Access Platform, 3.16 m (10 ft. 4 in.)	

B. Prepare

(1) With RAT extended, make certain that the following circuit breakers are tripped, safetied and tagged :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
RAT TEST No.1 CART SUP	1-213	M 761	R17
RAT IND No.2 CART SUP	3-213	M 762	B10

(2) To stow RAT during following procedures, use tool E920135000.

C. Adjust

(1) Rotate RAT turbine assembly to position blades vertically, with red arrow on leg centred on red band of latch plate. Stow RAT in stowage bay, making certain that latch rod tang engages in the slot of a latch plate.

(2) Using small non-metallic wedges, wedge the latch rod tang centrally in the latch plate slot. Check with feeler gauges that clearance is equal on each side of latch rod tang.

(3) Maintaining this position, adjust the large stop on the ejection jack to touch its adjacent blade. Similarly adjust large stop on valve module.

(4) Remove wedges and manually extend RAT.

(5) Screw both large stops half a turn inwards (representing 0.030 in. (0.76 mm) clearance between stops and their blades).

(6) Rotate turbine assembly clockwise to align red arrow on leg with extreme edge of red band on turbine latch plate.

(7) Maintain turbine assembly in this offset position and stow RAT in stowage bay. Check that latch rod tang fully engages in latch plate slot (turbine hub being guided into locking position by appropriate large stop). If full engagement is not obtained, screw stop outwards until full engagement is achieved.

(8) Manually extend RAT.

(9) Rotate turbine assembly anti-clockwise to align red arrow on leg with opposite edge of red band on turbine

latch plate.

(10) Proceed for the other large stop as in step (7), checking that latch rod tang fully engages in latch plate slot.

(11) Manually extend RAT.

(12) Rotate turbine assembly through 180 deg. and repeat steps (6) to (11).

(13) When adjustment is satisfactory, lock both stops with their locknuts and repeat steps (6) to (12).

(14) With RAT extended, disconnect ejection jack by removing self-locking nut, washers and attachment bolt.

NOTE : Do not misplace bush from operating rod fork end.

(15) Rotate turbine assembly to align red arrow on RAT leg with white line on turbine latch plate.

NOTE : This position represents an offset of the blades relative to the leg centreline.

(16) Maintain turbine assembly in this offset position, then set small stop of valve module as follows :

(a) Raise RAT towards fully stowed position and adjust small stop so that it clears blade tip by a maximum of 0.040 in. (1.02 mm) when tip is at its nearest point to stop during stowage arc.

(b) Continue to raise RAT towards stowed position and check that stop contacts concave side of blade.

(17) Carefully lower RAT and rotate turbine assembly through 180 deg. to align red arrow on leg with white line on other latch plate.

(18) Check adjustment of small stop on module as follows, always maintaining turbine assembly in offset position:

(a) Raise RAT towards fully stowed position, checking that blade tip clears stop.

(b) Continue to raise RAT towards stowed position, and check that small stop contacts concave side of blade.
Re-adjust stop if necessary.

(19) Carefully lower RAT and lock stop with its locknut, without disturbing stop setting.

(20) Connect ejection jack to RAT operating rod with bolt, washers and self-locking nut, checking that bush is positioned in operating rod fork end.
Torque self-locking nut to between 30 and 35 lbf.in. (40 and 47 Nm).

(21) Wirelock stops (Ref. 20-21-13).

D. Test

(1) Rotate turbine assembly clockwise to align red arrow on RAT leg with edge of red band on turbine latch plate.

(2) Stow RAT in stowage bay, checking that :

(a) The blades do not foul on stops or other structural components.

(b) The latch rod tang engages fully in a latch plate slot.

(3) Manually extend RAT

(4) Rotate turbine assembly anti-clockwise to align red arrow on RAT leg with other edge of red band on turbine latch plate.

(5) Stow RAT in stowage bay, and proceed with checks described in step (2) above.

(6) Manually extend RAT.

E. Close-Up

(1) Stow RAT (Ref. 29-24-13, Servicing).

(2) Remove access platform.

Printed in England

RAM AIR TURBINE - INSPECTION/CHECK

WARNING : MAKE CERTAIN THAT THE POSITIONS OF NOSE AND MAIN GEAR DOORS CORRESPOND WITH THE ACTUAL POSITIONS OF THE RESPECTIVE OPERATING HANDLES.
HANDLE LOCKED, INDICATOR PLATE SHOWING WHITE : DOORS CLOSED.
HANDLE LOCKED, INDICATOR PLATE SHOWING RED : DOORS OPEN.

MAKE CERTAIN THAT THE LANDING GEAR POSITION INDICATED ON THE GEARS POSITION INDICATING UNIT CORRESPONDS WITH THE ACTUAL POSITION OF THE LANDING GEAR.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE, MAKE CERTAIN THAT THE TRAVEL RANGES OF THE CONTROL SURFACES ARE CLEAR.

BEFORE PRESSURIZING HYDRAULIC SYSTEMS, CHECK THAT ALL CONTROLS ARE SET TO CORRESPOND WITH THE ACTUAL POSITION OF THE SERVICES THEY OPERATE.

MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

1. General

This topic describes the procedure for performing a general examination of the ram air turbine (RAT).

2. Ram Air Turbine

A. Equipment and Materials

DESCRIPTION	PART NO.
Ground Power Unit - Hydraulic - Power and Preliminary Testing	EMH398E
Rigging Pin - Ram Air Turbine	E930052000
Stowing Tool - RAT	E920135000
Device - Ram Air Turbine Access	E920151000
Access Platform - 3.160 m (10 ft. 4 in.)	

B. Prepare

Printed in England

(1) Take the precautions described in the previous WARNING paragraph.

(2) Position access platform.

(3) Remove RAT rigging pin E930052000.

(4) Extend RAT (Ref. 29-24-13, Servicing).

C. Inspection/Check

(1) Pressurize Green and Yellow hydraulic systems (Ref. 29-11-00, Servicing, and 29-21-00, Servicing).

(2) Check RAT assembly for signs of leakage. If leakage is detected, replace faulty components.

(3) Stop pressurizing Green and Yellow systems (Ref. 29-11-00, Servicing, and 29-21-00, Servicing).

(4) Thoroughly clean RAT assembly.

B B WARNING: IF A TURBINE BLADE IS FOUND BENT THE RAT MUST BE REPLACED.

(5) Check assembly for cracks, scoring, corrosion, damage to protective finishes, or any other damage.

(6) Check that attach fittings are secured correctly, and that all bolts, nuts and pins are correctly assembled and safetied.

R R (7) Check that clogging indicator of each filter is not protruding (Ref. 29-00-00, Inspection/Check).

RB RB RB (8) Check that the RAT propeller is free to rotate, if jerky or stiff contact the hydraulic workshop for an evaluation.

RB RB RB RB (9) Check that when stowing the RAT, the blade locking mechanism engages with the propeller preventing rotation. Seizure of the blade locking mechanism can be caused by over lubrication at the grease nipple.

D. Close-Up

(1) Retract RAT (Ref. 29-24-13, Servicing).

(2) Install RAT rigging pin E930052000.

(3) Disconnect and remove hydraulic ground power unit.

(4) Fit cover over opening 551PB.

(5) Remove access platform.

PRINTED IN ENGLAND

VALVE MODULE TYPE MV4 - REMOVAL/INSTALLATION

WARNING : MAKE CERTAIN THAT THE POSITIONS OF NOSE AND MAIN GEAR DOORS CORRESPOND WITH THE ACTUAL POSITIONS OF THE RESPECTIVE OPERATING HANDLES.
HANDLE LOCKED, INDICATOR PLATE SHOWING WHITE : DOORS CLOSED.
HANDLE LOCKED, INDICATOR PLATE SHOWING RED : DOORS OPEN.

MAKE CERTAIN THAT THE LANDING GEAR POSITION INDICATED ON THE GEARS POSITION INDICATING UNIT CORRESPONDS WITH THE ACTUAL POSITION OF THE LANDING GEAR.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE, MAKE CERTAIN THAT THE TRAVEL RANGES OF THE CONTROL SURFACES ARE CLEAR.

BEFORE PRESSURIZING HYDRAULIC SYSTEMS, CHECK THAT ALL CONTROLS ARE SET TO CORRESPOND WITH THE ACTUAL POSITION OF THE SERVICES THEY OPERATE.

MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

1. General

The Green system valve module MV4 provides the hydraulic connection between the ram air turbine (RAT) spinner and pump, and the aircraft hydraulic system.

2. Valve Module MV4

A. Equipment and Materials

DESCRIPTION	PART NO.
Hydraulic Fluid (Ref. 20-30-00, No.011)	
Corrosion-Resistant Steel Lockwire, dia. 1 mm (0.041in.)	
Blanking Plugs/Caps	

B. Prepare

(1) Remove RAT (Ref. 29-24-13, Removal/Installation).

(2) Cap open line ends on aircraft.

C. Remove

(1) Remove HP line (1) between RAT Green system pump and Green system valve module.

(2) Remove LP line (2) between RAT Green system pump and Green system module (13).

(3) Remove HP and LP line unions (3) from pump. Remove sealing rings (6), backup rings (7), washer (5) and shims (4) from each union.

(4) Disconnect turbine supply line (9) from valve module. If necessary, loosen coupling nut at pump end of line to facilitate disconnection.

(5) Disconnect turbine return line (8) from valve module. If necessary, loosen coupling nut at pump end of line to facilitate disconnection.

(6) Remove attachment nuts (11) from module. Remove buffer bracket (12), shims (10) and valve module (13).

(7) Plug all ports opened to atmosphere owing to disconnection of lines.

D. Preparation of Replacement Component

(1) Remove all blanking plugs/caps from replacement component.

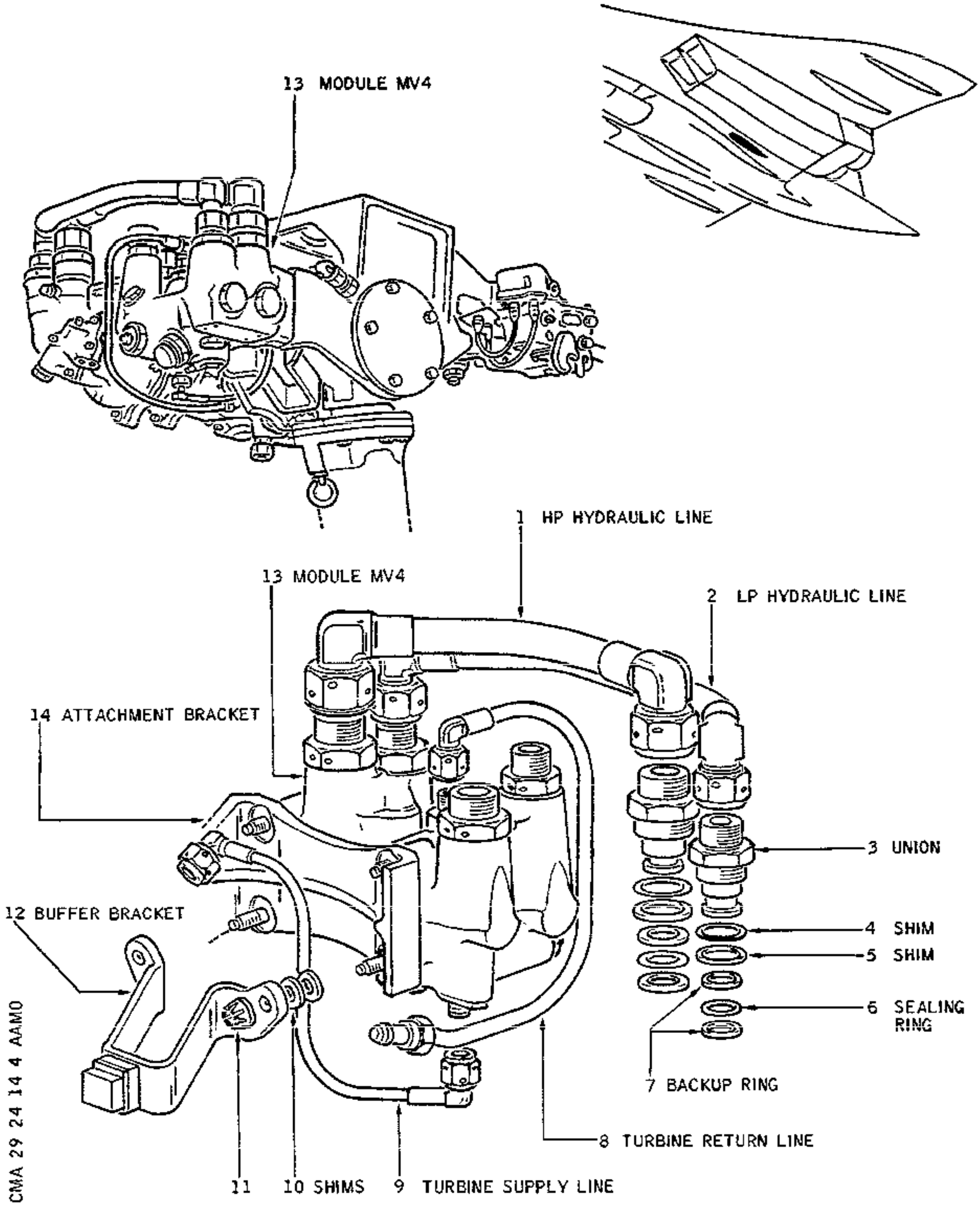
NOTE : Hydraulic fluid, Product No.011, shall be applied to all sealing rings and to nut threads.

E. Install

(1) Position valve module (13) on attachment bracket (14), position shims (10), buffer bracket (12), and secure assembly with nuts (11). Torque nuts to 21 Nm (15.8 lbf.ft.).

(2) Connect supply line (9) and return line (8) to associated unions on valve module. Tighten nuts at both ends of each line. Torque to between 13.5 and 16.0 Nm (10 and 12 lbf.ft.).

(3) Install LP line union (3) on RAT Green system pump. Do not install sealing ring, backup rings or shims.



Removal of Module MV4
R Figure 401

(4) Measure and record distance between mounting face of RAT attachment bracket and end face of LP union on valve module. Measure and record distance between same mounting face and end face of LP union on pump. Compare the two dimensions noted and calculate thickness of washer and shims required under pump union to align the two unions.

(5) Remove union from pump and install prepared shims and washer. Install sealing ring and backup rings. Install union in pump. Torque to 81.3 Nm (60 lbf.ft.).

(6) Connect LP line to the two unions and secure with coupling nuts, making certain that no strain is applied to line. Torque nuts to between 38 and 41 Nm (28 and 30 lbf.ft.). Check that line is parallel to attachment bracket mounting face.
Wirelock nuts.

(7) Connect HP line (1), following identical procedure to that used for LP line (2). Torque union on pump to 74.5 Nm (55 lbf.ft.), and torque coupling nuts to between 31 and 34 Nm (23 and 25 lbf.ft.).

F. Close-Up

(1) Install RAT (Ref. 29-24-13, Removal/Installation).

VALVE MODULE TYPE MV5 - REMOVAL/INSTALLATION

WARNING : MAKE CERTAIN THAT THE POSITIONS OF NOSE AND MAIN GEAR DOORS CORRESPOND WITH THE ACTUAL POSITIONS OF THE RESPECTIVE OPERATING HANDLES.
HANDLE LOCKED, INDICATOR PLATE SHOWING WHITE : DOORS CLOSED.
HANDLE LOCKED, INDICATOR PLATE SHOWING RED : DOORS OPEN.

MAKE CERTAIN THAT THE LANDING GEARS POSITION INDICATING UNIT CORRESPONDS WITH THE ACTUAL POSITION OF THE LANDING GEAR.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE, MAKE CERTAIN THAT THE TRAVEL RANGES OF THE CONTROL SURFACES ARE CLEAR.

BEFORE PRESSURIZING HYDRAULIC SYSTEMS, CHECK THAT ALL CONTROLS ARE SET TO CORRESPOND WITH THE ACTUAL POSITION OF THE SERVICES THEY OPERATE.

MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

1. General

The Yellow system valve module MV5 provides the hydraulic connection between the ram air turbine (RAT) Yellow system pump and the aircraft system.

2. Valve Module MV5

A. Equipment and Materials

DESCRIPTION	PART NO.
Alignment Fixture	460003495
Corrosion-Resistant Steel Lockwire, dia. 1 mm (0.041 in.)	
Blanking Plugs/Caps	

B. Prepare

(1) Remove RAT (Ref. 29-24-13, Removal/Installation).

(2) Cap open line ends on aircraft.

C. Remove

(1) Remove LP pipes between valve module (28) and RAT Yellow system pump.

(a) Unscrew coupling nut (27) securing front LP pipe (26) to valve module.

(b) Remove nuts (18), washers (24) and bolts (25) securing centre flanged joint of pipes.

(c) Remove front LP pipe (26), seal housing (14), shims (15) and remove sealing rings (23) from seal housing.

(d) Unscrew sleeve nut (17) from pump. Remove rear LP pipe (16), sealing ring (21), backup rings (22), washer (20) and shims (19).

(2) Remove HP pipe (7) between valve module (28) and RAT Yellow system pump.

(a) Remove bolts (6) and washers (5) securing pipe to module.

(b) Unscrew sleeve nut (8) and remove pipe (7).

(c) Remove sealing ring (12), backup rings (11), washer (10) and shims (9).

(d) Remove seal housing (13) from module, remove sealing rings (4), backup rings (3), packing (1) and shims (2).

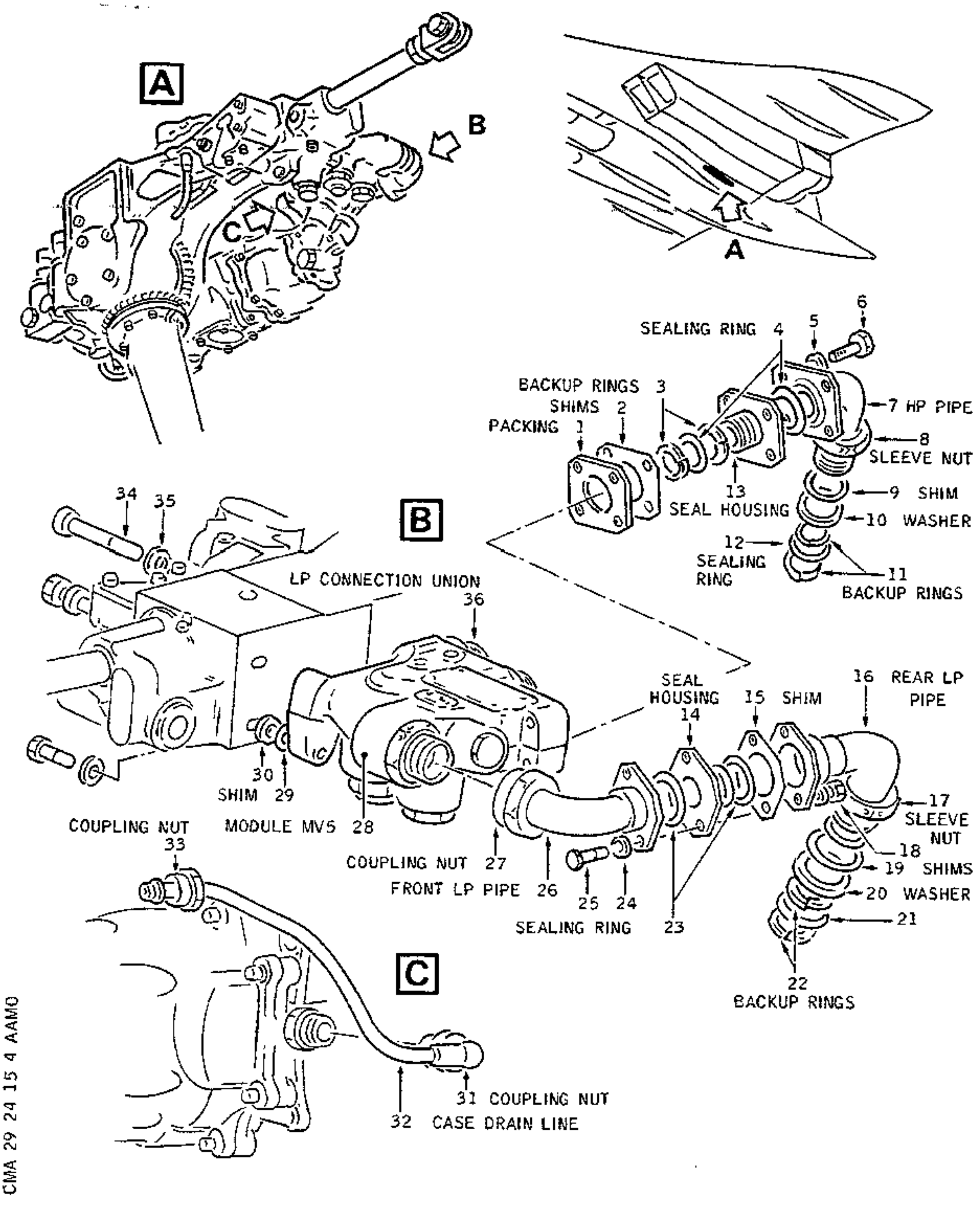
(3) Unscrew coupling nut (33) securing case drain pipe (32) to valve module. Unscrew coupling nut (31) from pump and remove case drain pipe (32).

**ON A/C 001-004,
(Ref. Fig. 401)

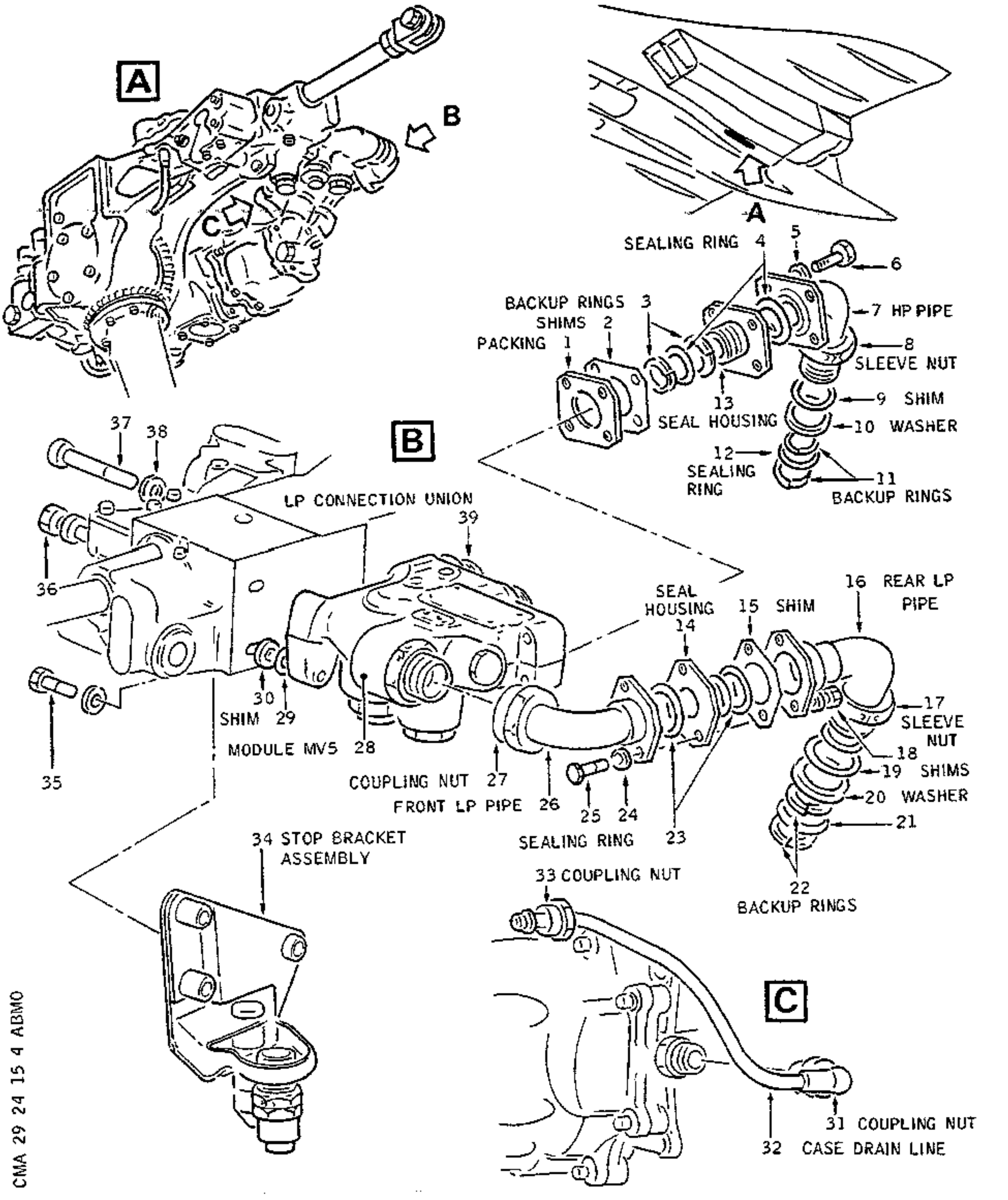
(4) Remove bolts (34), washers (35) and (29), shims (30) securing valve module to attachment bracket. Remove valve module.
Plug all ports opened to atmosphere owing to disconnection.

After SB 29-024 For A/C 001-004,

(Ref. Fig. 402)



Removal of Valve Module MV5
Figure 401



Removal of Valve Module MV5
Figure 402

(4) Loosen bolts (35), (36) and (37), but do not remove from stop bracket assembly (34).
Remove stop bracket assembly complete with bolts.

(5) Remove module (28), washers (29) and shims (30).

(6) Remove bolts (35), (36) and (37), and washers (38) from stop bracket assembly (34).

(7) Plug all ports opened to atmosphere owing to disconnection.

D. Preparation of Replacement Component

(1) Remove all blanking plugs/caps from replacement component.

NOTE : All sealing rings and nut threads shall be lubricated with hydraulic fluid, Product No.11.

E. Install (Ref. Fig. 403)

(1) Install alignment fixture 460003495 on mounting face of RAT attachment bracket, and secure with bolts.

**ON A/C 001-004,

(2) Install valve module MV5.
(Ref. Fig. 401)

(a) Position valve module on attachment bracket, with LP connection union (36) over spigot of alignment fixture.

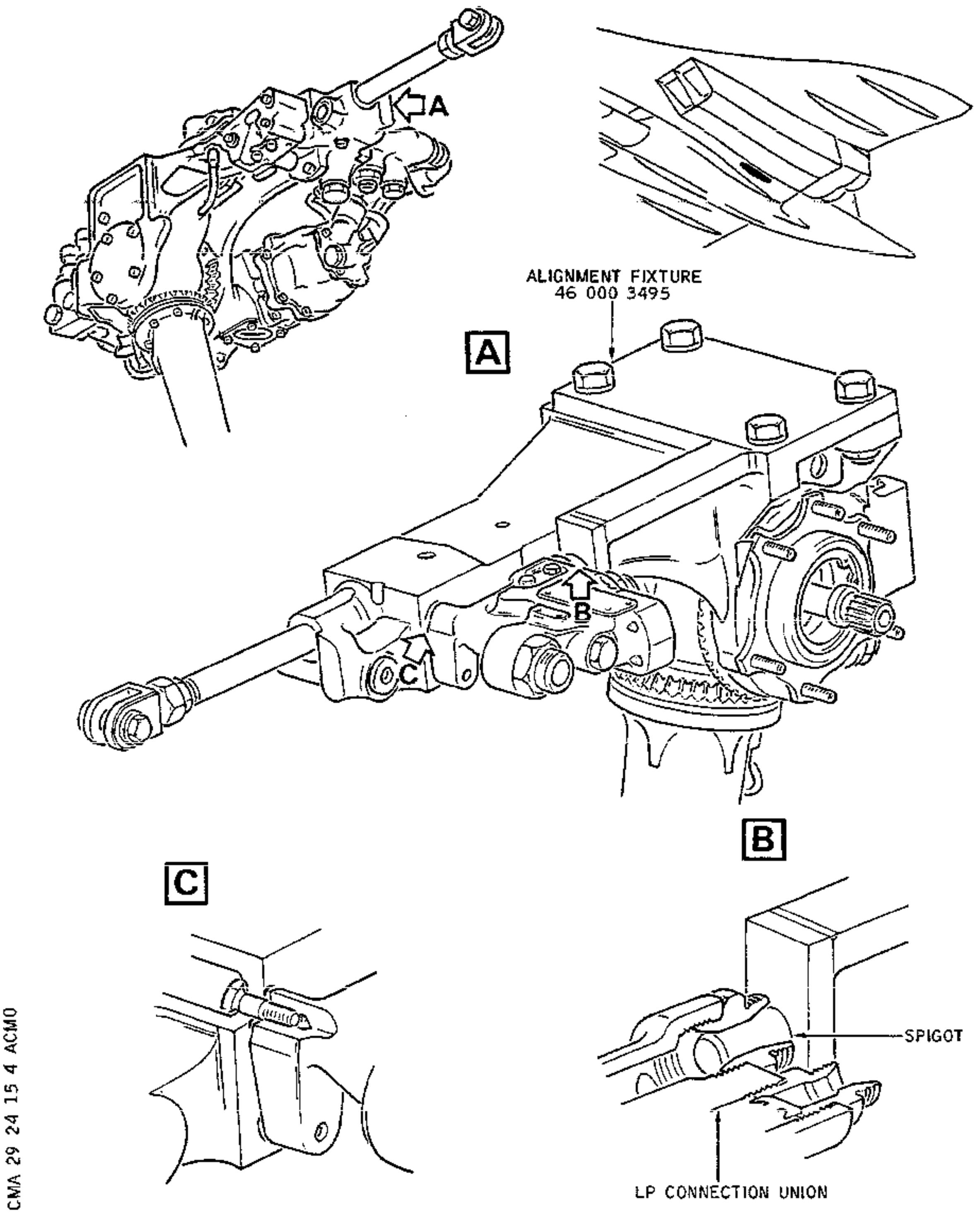
(b) Install bolts (34) fitted with washers (35) and interpose washers (29) and shims (30) as suitable between module mounting face and attachment bracket.

(c) Torque bolts (34) to 10 Nm (90 lbf.in.).

After SB 29-024 For A/C 001-004,

(2) Install valve module MV5
(Ref. Fig. 402)

(a) On stop bracket assembly (34), install bolts (35), (36) and (37) fitted with washers (38), and position assembly on attachment bracket.



Alignment of Module MV5
Figure 403

R

(b) Position valve module (28) on RAT, with LP connection union (39) over spigot of alignment fixture.

(c) Interpose washers (29) and shims (30), as suitable, between valve module (28) and mounting face on RAT.

(d) ~~Torque bolts (35), (36) and (37) to 10 Nm (90 lbf.~~ in.).

(e) Wirelock as per 20-21-13 :
- Bolt (36) to bolt (37)
- Bolt (35) to stop bracket assembly (34).

(f) On stop bracket assembly, place locknut and stop on carrier and screw fully down.

<u>NOTE</u> : Do not fully tighten or wirelock at this stage.

(3) Remove bolts attaching alignment fixture 460003495 and carefully remove fixture.

(4) Connect case drain pipe (32) to associated union on valve module. Tighten coupling nuts (33) and (31) and torque to between 13.5 and 16.0 Nm (10 and 12 lbf.in.). Wirelock as per 20-21-13.

(5) Install HP pipe

(a) Position seal housing (13) in respective port in valve module, without installing sealing ring, backup rings or shims.

(b) Install HP pipe (7) on pump port, without installing sealing ring, backup rings or shims. Screw sleeve nut (8) without fully tightening it.

(c) Align pipe flange with seal housing flange, and measure distance between the two flanges. Prepare shims (2) to this dimension, using also packing (1).

(d) Calculate thickness of shims (9) and washer, required under sleeve nut (8) to align flange of pipe (7) with seal housing (13). Remove pipe.

(6) Install sealing rings (4), backup rings (3), shims (2) and packing (1) on seal housing (13). Install

seal housing assembly on valve module.

(7) Connect pipe (7) to pump and to seal housing (13).

(8) Install bolts (6) and washers (5) to secure the two flanges, but do not fully tighten bolts.

(9) Install sealing ring (12), backup rings (11), washer (10) and shims (9). Screw on sleeve nut (8), making certain that no strain is applied to pipe.

(10) Tighten bolts (6).
Torque to 10 Nm (90 lbf.in.).
Tighten sleeve nut (8).
Torque to between 31 and 34 Nm (23 and 25 lbf.ft.).
Wirelock as per 20-21-13.

(11) Position front LP pipe (26) and lightly screw in coupling nut (27) to hold pipe in position.

(12) Following same procedure as for HP pipe, calculate thickness of shims required at each end of rear LP pipe (16).

(13) Install LP pipe.

(a) Install sealing ring (21), backup rings (22), washer (20) and shims (19). Lightly screw on sleeve nut (17).

(b) Install shims (15), sealing rings (23), seal housing (14). Attach the two pipe flanges with bolts (25), washers (24) and nuts (18).

(c) Torque nuts to 5.1 Nm (45.0 lbf.in.).
Torque sleeve nut (17) and coupling nut (27) to between 38 and 41 Nm (28 and 30 lbf.ft.).
Wirelock as per 20-21-13.

(14) Install RAT (Ref. 29-24-13, Removal/Installation).

F. Test

Adjust RAT blade stowage guide stops (Ref. 29-14-13, Adjustment/Test).

G. Close-Up

(1) Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(2) Stow RAT (Ref. 29-24-13, Servicing).

After SB 29-024 For A/C 001-004,

3. Ram Air Turbine Blade Stowage Guide Stops

A. Equipment and Materials

DESCRIPTION	PART NO.
Corrosion Resistant Steel Lockwire, Dia. 1 mm (0.041 in.)	

B. Prepare

(1) Extend RAT (Ref. 29-24-13, Servicing).

(2) Mark exact position of valve module MV5 on RAT.

C. Remove

(1) Cut and remove lockwire, loosen bolts (35), (36) and (37), but do not remove.

(2) Remove bolt (35) fitted with its washer (38).

(3) Remove stop bracket assembly (34) and bolts (36) and (37) with their associated washers (38).

(4) Matchmark washers (29) and shims (30) with their associated bolts.

(5) Maintain valve module MV5 in position with a slave bolt installed in hole of bolt (36), but in opposite direction.
(Ref. Fig. 404)

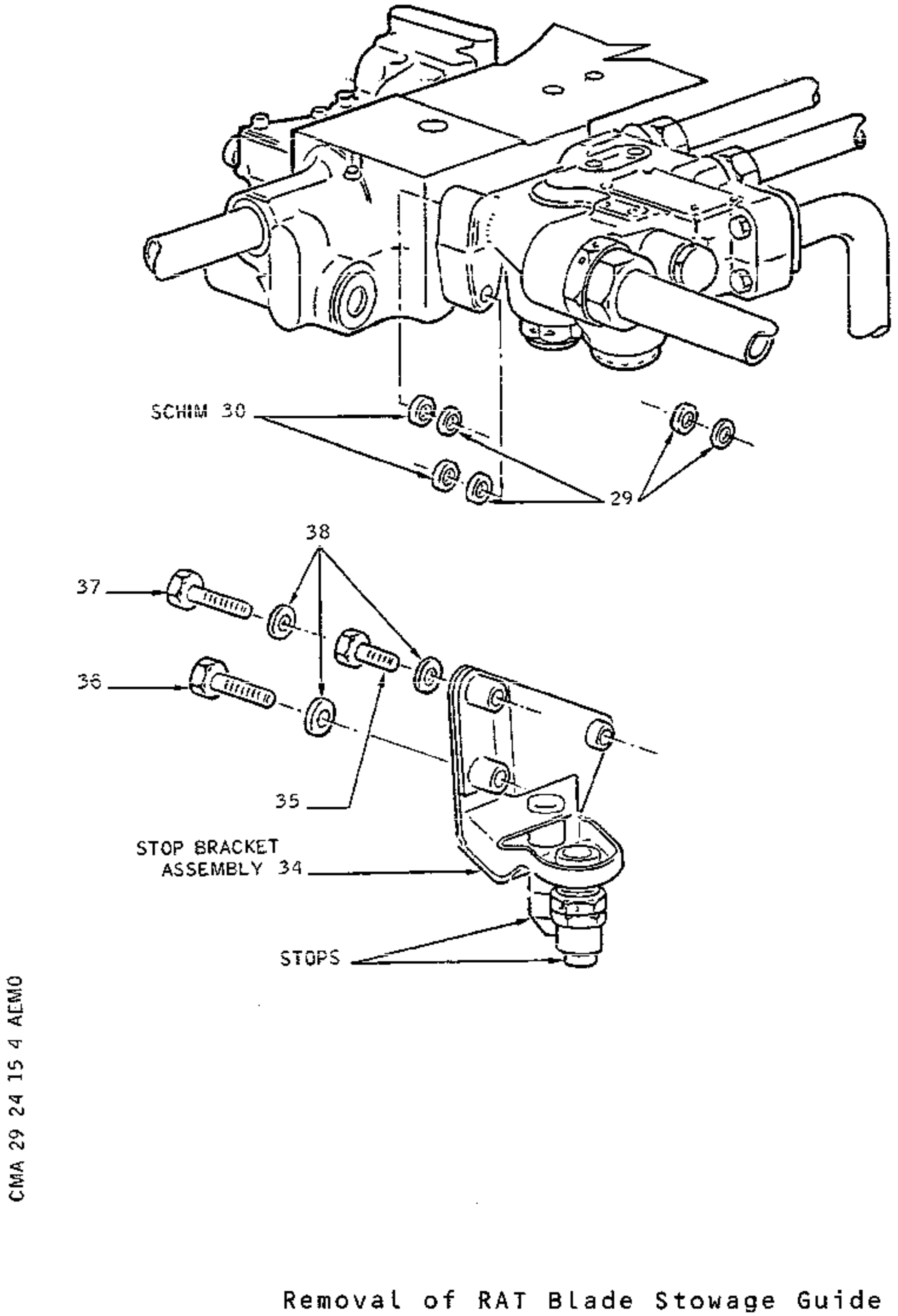
D. Preparation of Replacement Component

(1) Place bolts (36) and (37), complete with washers (38), in stop bracket assembly (34).

E. Install

(1) On valve module MV5, remove slave bolt from hole of bolt (36).

(2) Place stop bracket assembly in position, and insert



Removal of RAT Blade Stowage Guide Stops
Figure 404

the three mounting bolts.

(3) Install washers (29) and shims (30) on matchmarked bolts (35), (36) and (37).

(4) Check with markings that valve module MV5 is in original position.

(5) Torque bolts (35), (36) and (37) to 10 Nm (90 lbf.in.).

(6) Wirelock as per 20-21-13 :
- Wirelock bolt (36) to bolt (37)
- Wirelock bolt (35) to stop bracket assembly (34).

(7) Place locknuts and stops on carriers and screw fully down.

NOTE : Do not fully tighten or wirelock at this stage.

F. Test

Adjust RAT blade stowage guide stops (Ref. 29-24-13, Adjustment/Test).

G. Close-Up

(1) Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(2) Stow RAT (Ref. 29-24-13, Servicing).

UPLOCK UNIT - REMOVAL/INSTALLATION

1. General

The uplock unit locks the ram air turbine (RAT) when stowed. The uplock can be released electrically, from the flight compartment, or manually, on the ground.

This topic covers: removal/installation of the uplock unit and removal/installation of the uplock release gas cartridges.

2. Uplock Unit (Ref. Fig.401)

A. Equipment and Materials

DESCRIPTION	PART NO.
Device - RAT access	E920151000
Stowing tool - RAT	E920135000
Rigging pin - RAT	E930052000
Electrical ground power unit	-
Access platform - 10 ft 4 in (3.160 m)	-
Corrosion-resistant steel lockwire, dia. 1 mm (0.041 in)	-

B. Prepare

(1) Remove RAT rigging pin E930052000.

(2) Extend RAT manually (Ref. 29-24-13, Servicing).

(3) Trip safety and tag the following circuit breakers:

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
RAT TEST No. 1 CART SUP	1-213	M 761	R17
RAT IND No. 2 CART SUP	3-213	M 762	B10

PRINTED IN ENGLAND

C. Remove

(1) Disconnect electrical plugs (1) on gas cartridge electrical firing circuit.

(2) Remove bolts (2) securing uplock unit to RAT mounting bracket. Remove and retain washers. Remove uplock unit.

D. Preparation of Replacement Component

Not applicable.

E. Install

(1) Position uplock unit on RAT mounting bracket and secure with
R bolts (2) together with associated washers. Torque bolts to
R 18 Nm (13.3 lbf ft). Wirelock bolt heads.

(2) Connect electrical plugs (1) to corresponding receptacles on gas cartridge electrical firing circuit.

F. Test

(1) Manually stow and extend RAT (Ref. 29-24-13, Servicing). If required, adjust uplock pin (Ref. Adjustment/Test) and adjust blade stowage guide stops, if installed (Ref. 29-24-13, Adjustment/Test).

G. Close-Up

(1) Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(2) Retract RAT (Ref. 29-24-13, Servicing).

(3) Install RAT rigging pin E930052000.

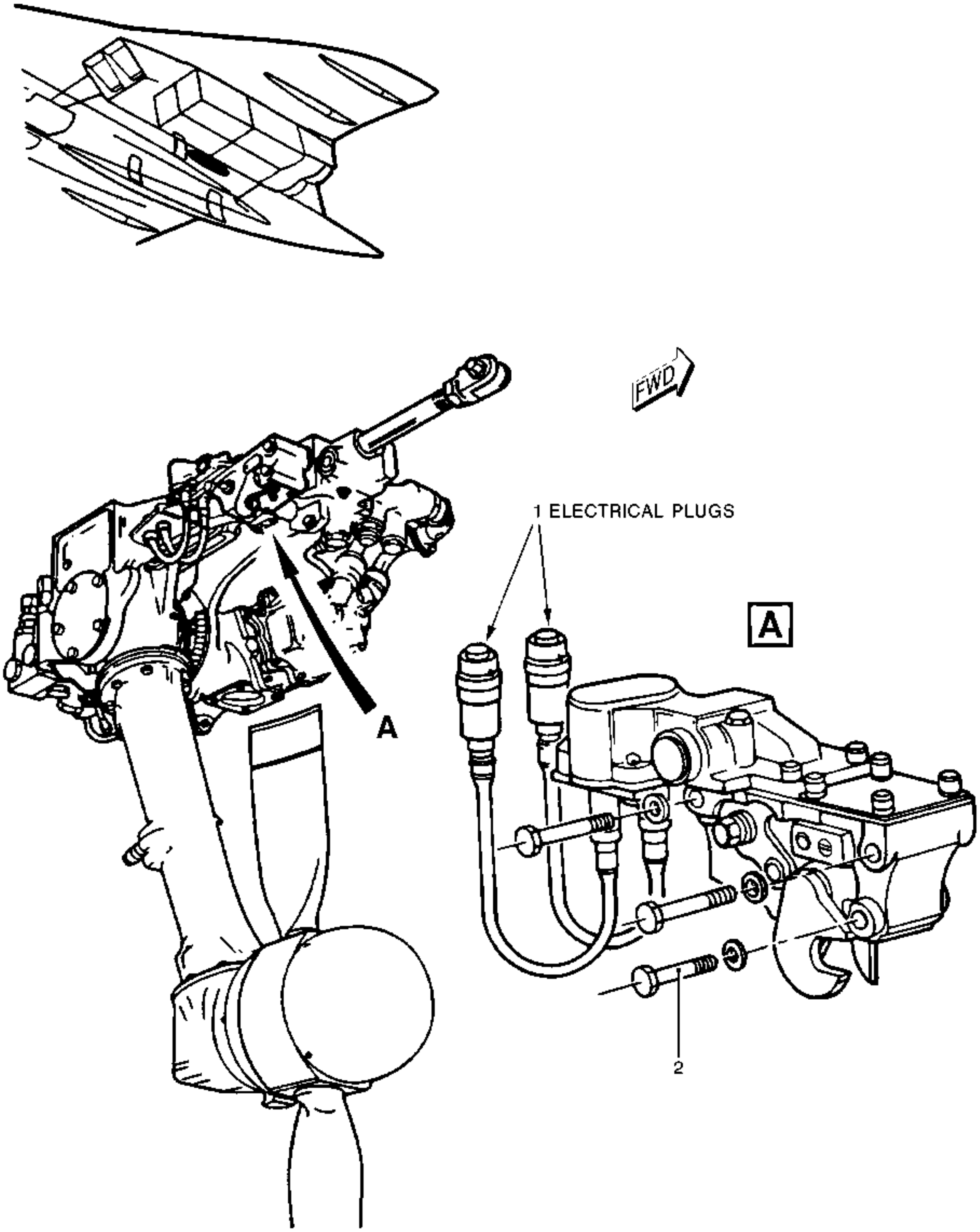
(4) Remove safety clips and tags and set the following circuit breakers:

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
RAT TEST No. 1 CART SUP	1-213	M 761	R17
RAT IND No. 2 CART SUP	3-213	M 762	B10

(5) Remove access platform.

PRINTED IN ENGLAND

PRINTED IN ENGLAND



Uplock Unit
Figure 401

3. Cartridges - Gas, Uplock Release

R
R
R

A. Equipment and Materials

DESCRIPTION	PART NO.
Rigging pin - RAT	E930052000
Device - RAT access	E920151000
Stowing tool - RAT	E920135000
Electrical ground power unit	-
Corrosion-resistant steel lockwire, dia. 0.8 mm (0.032 in)	-
Access platform, 10 ft 4 in (3.160 m)	-
Multimeter	-
Megger	-
Circuit breaker safety clips	-
Safety ohmmeter	DHP801

B. Prepare

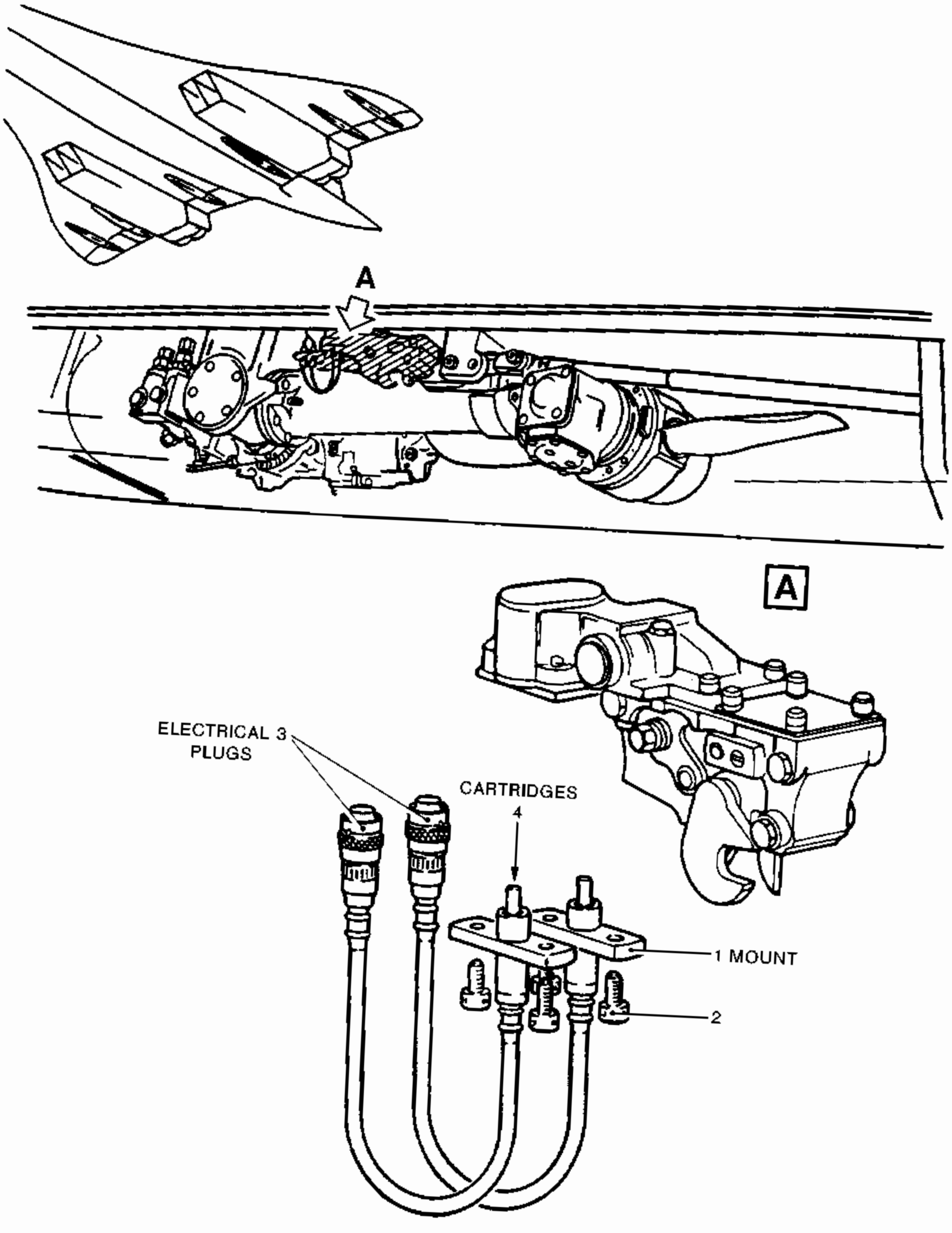
(1) Remove rigging pin E930052000.

(2) Manually extend ram air turbine (RAT) (Ref. 29-24-13, Servicing).

(3) Trip safety and tag the following circuit breakers:

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
RAT TEST No. 1 CART SUP	1-213	M 761	R17
RAT IND No. 2 CART SUP	3-213	M 762	B10

PRINTED IN ENGLAND



PRINTED IN ENGLAND

CMB 29 24 16 4 ACM0 00

Uplock Release Gas Cartridges
Figure 402

C. Remove

R (1) Disconnect electrical plug(s) (3).

(2) Cut and remove lockwire, remove screws (2) attaching cartridge mount(s) (1).

RB (3) Remove cartridge (4). Remove and retain shim.

(4) Energize the aircraft electrical network (Ref. 24-41-00, Servicing).

(5) Remove safety clips and tags and set the following circuit breakers:

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
RAT TEST No. 1 CART SUP	1-213	M 761	R17
RAT IND No. 2 CART SUP	3-213	M 762	B10

(6) Electrically check each firing circuit aircraft wiring connector as follows:

(a) Connect a voltmeter between terminal A and ground. The voltmeter must give a zero reading.

(b) Connect a megger between terminal B and ground. Circuit insulation resistance must not be less than 20 megohms, with 500 volts applied.

(7) Trip safety and tag the following circuit breakers:

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
RAT TEST No. 1 CART SUP	1-213	M 761	R17
RAT IND No. 2 CART SUP	3-213	M 762	B10

PRINTED IN ENGLAND

RB (8) Prior to installation of cartridge (4) to aircraft, carry out continuity resistance check.

B WARNING: THE MAXIMUM NO-FIRE AMPERAGE OF CARTRIDGE IS 500 mA. UNDER NO CIRCUMSTANCES MUST THIS BE EXCEEDED.

B REMOVE THE TRANSIT SHUNT FROM THE CARTRIDGE CONNECTOR PRIOR TO TEST OR CONNECTION.

B Using a safety ohmmeter, measure resistance across pin A and pin B of the cartridge connector. The resistance must be within 0.55 to 0.80 ohms. Reject any cartridge assembly which falls outside these limits.

R (9) Install cartridge (4) in mount (1).

CAUTION: CHECK SERVICEABILITY OF NEW CARTRIDGES. RECORD DATE OF INSTALLATION ON AIRCRAFT.

B (10) Position one shim on each cartridge mount. Install cartridge mounts with screws (2). Fully tighten screws. Torque to 1.24 Nm (10.8 lbf in), then wirelock.

R (11) Connect a voltmeter between terminal A and ground. The voltmeter must give a zero reading.

R (12) Connect plug(s) (3) to associated receptacle(s).

R (13) Remove safety clips and tags and set the following circuit breakers:

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
RAT TEST No. 1 CART SUP	1-213	M 761	R17
RAT IND No. 2 CART SUP	3-213	M 762	B10

D. Test

(1) Test continuity (Ref. 29-24-00, Adjustment/Test).

PRINTED IN ENGLAND

E. Close-Up

(1) De-energize the aircraft electrical network (Ref. 24-41-00, Servicing).

(2) Manually retract RAT (Ref. 29-24-13, Servicing).

(3) Install rigging tool E930052000.

(4) Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(5) Disconnect and remove electrical ground power unit.

(6) Remove access platform.

PRINTED IN ENGLAND

UPLOCK UNIT - ADJUSTMENT/TEST

1. General

R R This topic describes the adjustment procedures ensuring correct positioning and uplocking of the ram air turbine.

R 2. Adjustment of Uplock Pin

A. Equipment and Materials

DESCRIPTION	PART NO.
Rigging Pin - Ram Air Turbine	E930052000
Device - Ram Air Turbine Access	E920151000
Stowing Tool - RAT	E920135000
Access Platform - 3.160 metres (10 ft. 4 in.)	
Hydraulic Fluid (Ref. 20-30-00, No.011)	

B. Prepare

(1) Remove rigging pin E930052000 from RAT.

(2) Manually retract RAT (Ref. 29-24-13, Servicing).

C. Adjust

(1) Remove nut and washer securing eccentric sleeve of uplock pin.

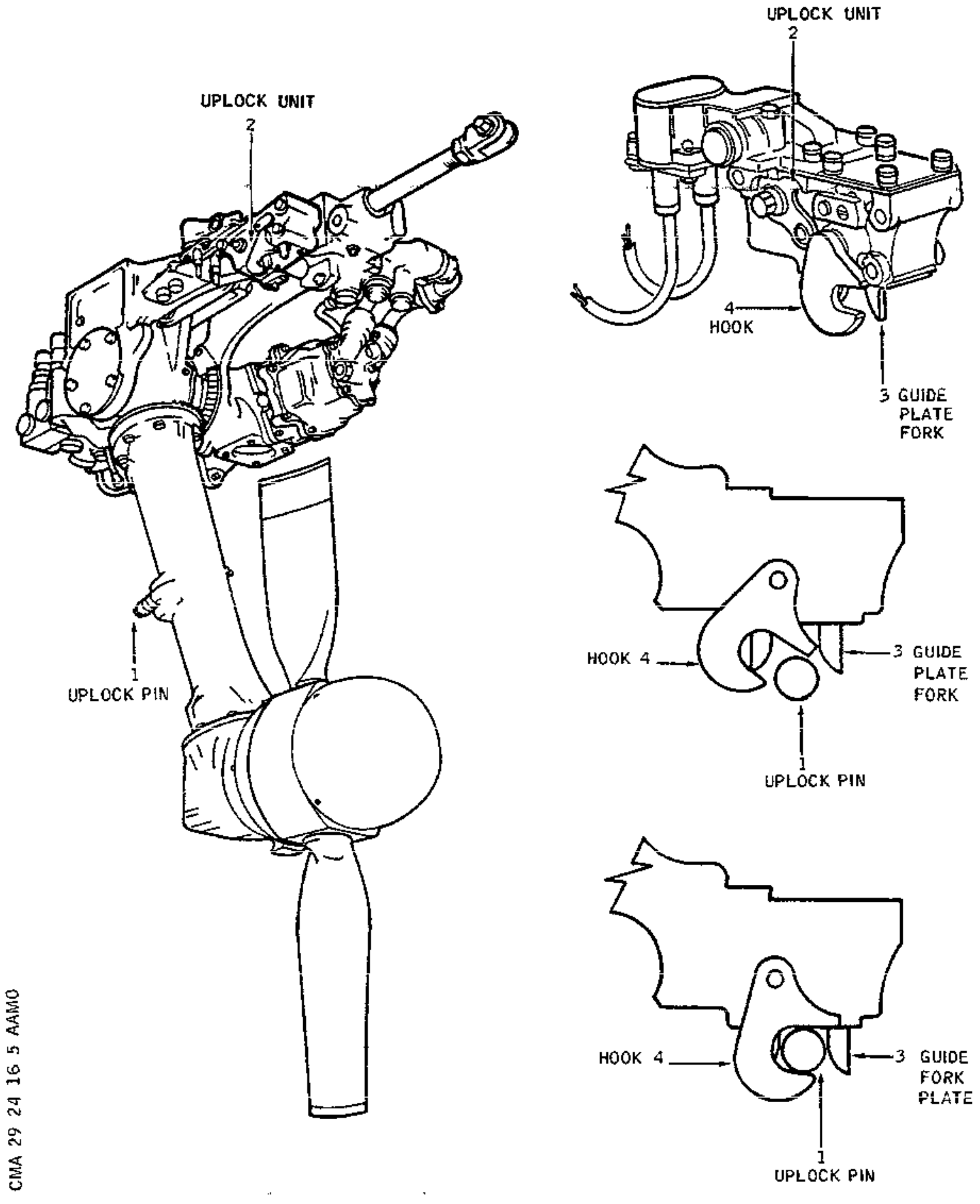
(2) Install stowing tool E920135000.

(3) Lift RAT leg upwards.

R R R (4) Turn sleeve as necessary to centre uplock pin (1) in guide plate fork (3) on uplock unit (2), and to ensure engagement with uplock hook (4).

R R NOTE : Adjust eccentric sleeve so that RAT leg is in max. "up" position (towards wing upper surface).

(5) Secure eccentric sleeve with nut and washer. Coat threads with Product No.011.



R Adjustment of Uplock Pin on Ram Air Turbine Leg
Figure 501

Tighten nut and torque to 21 m.N (15.8 lbf.ft.)

After SB 29-024 For A/C 001-004,

(6) Adjust RAT blade stowage guide stops (Ref. 29-24-13, Adjustment/Test).

D. Test

Retract and extend RAT manually (Ref. 29-24-13, Servicing) to check for correct engagement and release of uplock unit.

E. Close-Up

(1) Make certain working area is clean and clear of tools and miscellaneous items of equipment.

(2) Manually retract RAT (Ref. 29-24-13, Servicing).

(3) Install rigging pin E930052000

(4) Remove access platform.

SPRING ROD- REMOVAL/INSTALLATION

1. General

The removal/installation for both spring rods being identical, the procedure for the forward spring rod only is described in this topic.

2. Spring Rod

A. Equipment and Materials

DESCRIPTION	PART NO.
Device - Ram Air Turbine Access	E920151000
Rigging Pin - Ram Air Turbine	E930052000
General Lubricants (Ref. 20-30-00, No.51).	
Access Platform	

B. Prepare

(1) Trip, safety and tag the following circuit breakers :

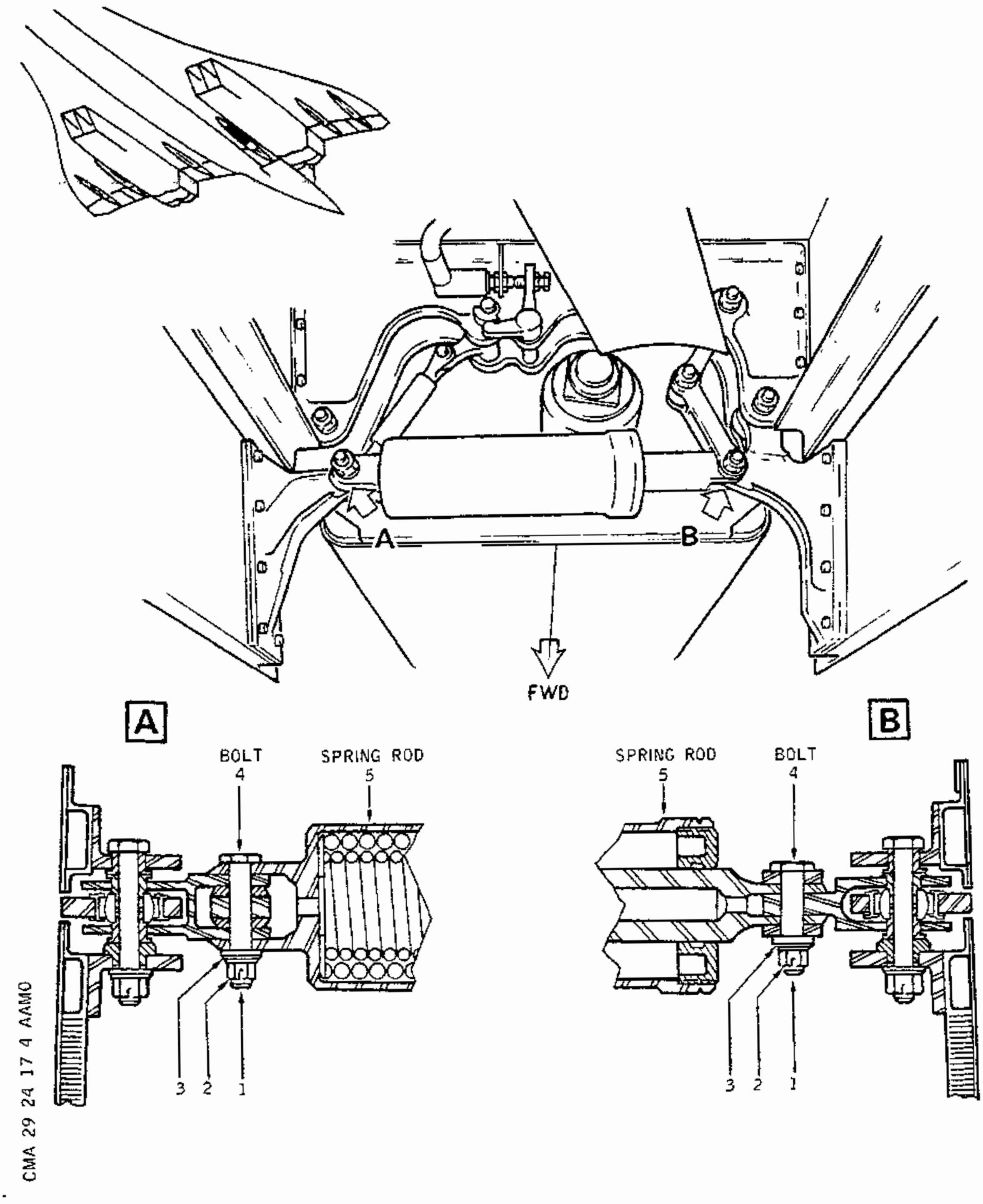
SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
RAT TEST No.1 CART SUP	1-213	M 761	R17
RAT IND No.2 CART SUP	3-213	M 762	R10

(2) Make certain that rigging pin E930052000 is in position. If not, install in RAT.

(3) Open doors 551 GB and 551 FB by means of access device E920151000.

C. Remove

(1) Remove cotter pins (1) loosen and remove nuts (2) remove washers (3).



Spring Rod
Figure 401

(2) Support spring rod and remove bolts (4). Remove spring rod (5).

D. Preparation of Replacement Component

E. Install

(1) Position spring rod (5).

(2) Align fork-end borings and insert bolts (4).

NOTE : Lubricate the threaded and unthreaded parts of bolt with Product No.51.

(3) Install washers (3) nuts (2). Tighten nuts and Torque to between 0.2 and 0.7 mdaN (17.701 and 61.955 lbf.in.) Safety with cotter pins.

F. Test

G. Close-Up

(1) Close doors 551 GB and 551 FB, remove access device 920151000.

(2) Remove access platform.

(3) Set circuit breakers M761 and M762.

DOORS - REMOVAL/INSTALLATION

1. General

The removal/installation for both doors being identical, the procedure for one door only is described in this topic.

2. Doors

A. Equipment and Materials

DESCRIPTION	PART NO.
Device - Ram Air Turbine Access	E920151000
Rigging Pin - Ram Air Turbine	E930052000
General Lubricants (Ref. 20-30-00, No.051)	
Corrosion Resistant Steel Lockwire, Dia. 0.8 mm (0.032 in)	
Electrical Ground Power Unit	
Access Platform	

B. Prepare

(1) Trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
RAT TEST No.1 CART SUP	1-213	M 761	R17
RAT IND No.2 CART SUP	3-213	M 762	B10

(2) Install rigging pin E930052000.

(3) Open doors 551GB and 551FB by means of access device E920151000.

R (4) Remove spring rods (Ref. 29-24-17, Removal/Installation).

C. Remove (Ref. Fig. 401)

(1) Disconnect bonding strip from door.

(2) Remove cotter pins (6) (14) (20), loosen and remove nuts (5) (13) (19) and washers (4) (12) (18).

(3) Support the door, remove bolts (1) (9) (17), remove the door and stirrups (7) and (15).

(4) Remove spacers (2) (8) (10) (16) and bushes (3) and (11).

D. Preparation of Replacement Component

(1) Apply lubricant Product No.051 to outer surfaces of bushes (3) (11) and install latter on stirrup (7) (15).

(2) Apply lubricant Product No.051 to outer surfaces of spacers (2) (8) (10) (16) and install them in corresponding fork ends.

(3) Make certain that hinge point g in drawing detail B is absolutely in line with hinge points f and h located on the front and rear linkages (details A and C).

E. Install

(1) Position the door and stirrups and align all fork-end and eye-end borings. Apply Product No.051 to threaded and unthreaded parts of bolts (1) (9) and (17), then install.

(2) Install washers (4) (12) (18), nuts (5) (13) and (19). Tighten nuts and Torque nuts (5) and (13) to between 0.2 and 1.3 m.daN (17.701 and 115.059 lbf.in.). Safety with cotter pin.

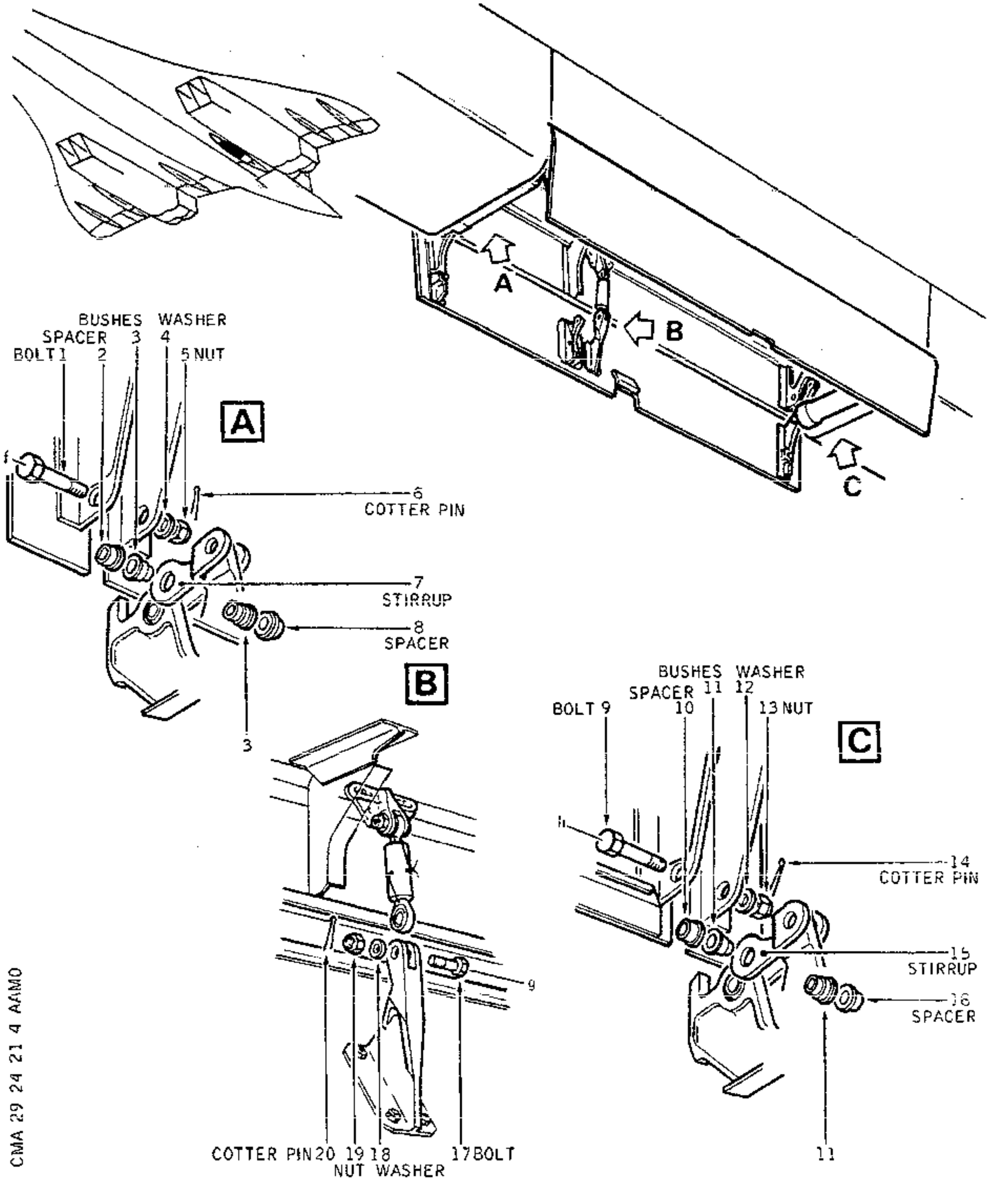
(3) Install spring rods (Ref. 29-24-17, Removal/Installation).

(4) Attach bonding strip to door.

F. Adjust

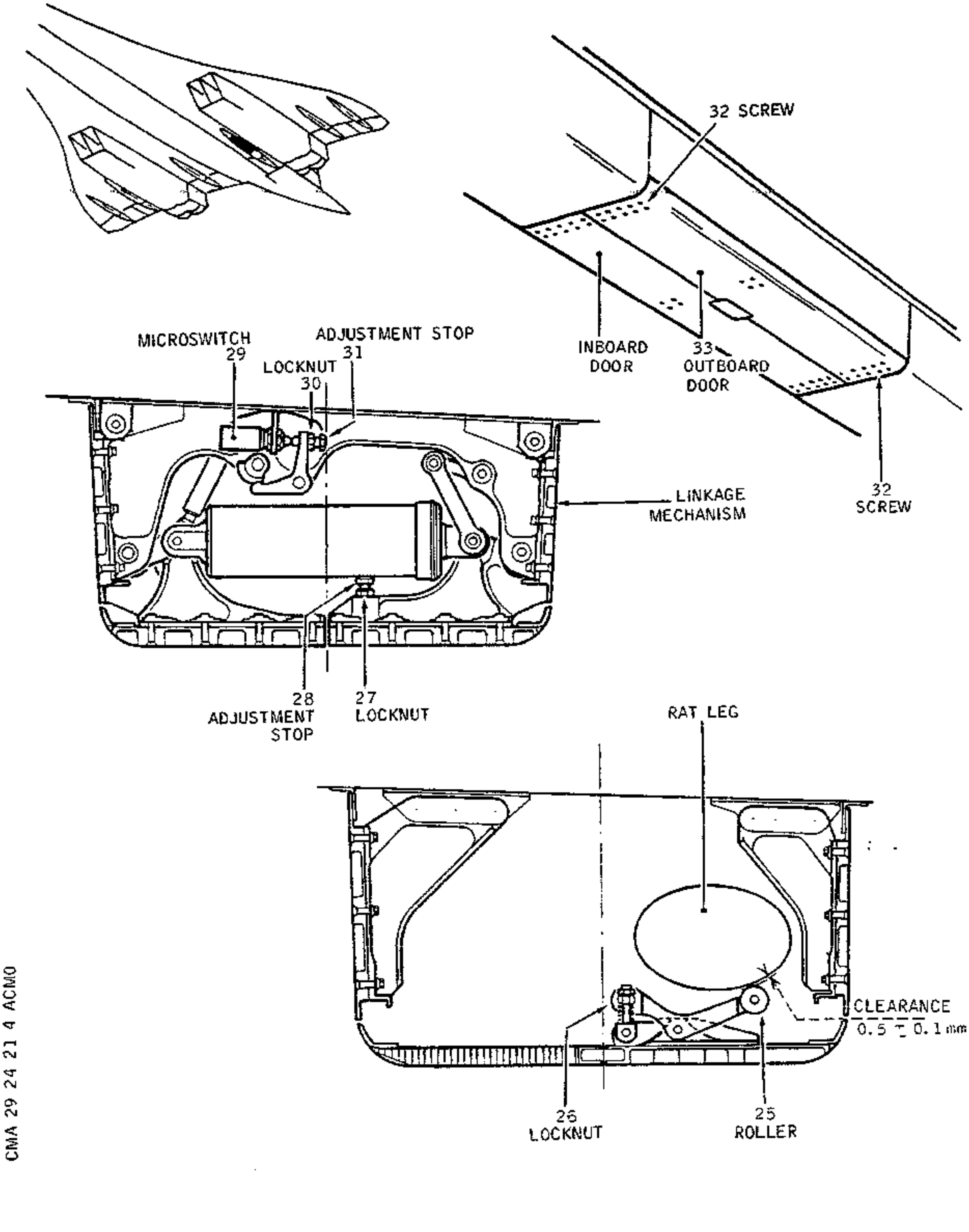
**ON A/C 001-004,
(Ref. Fig. 402)

After SB 29-025 For A/C 001-004,



RAT Stowage Bay Door Installation
Figure 401

Printed in England



R Adjustment of RAT Stowage Bay Doors
Figure 402

(Ref. Fig. 403)

(1) Remove outboard door (33).

(a) Remove cotter pin (20) loosen and remove nut (19) remove washer (18) and bolt (17).

(b) Disconnect bonding strip from door. Loosen screws (32) remove outboard door (33).

(2) Close inboard door by means of access device E920151000.

(3) Adjust stops (28) on forward and aft linkages.

(a) Adjust stops (28) resting on body of spring rod.

(b) Fully tighten locknut (27) and wirelock (Ref. 20-21-13).

**ON A/C 001-004,

(4) Adjust roller (25).

(a) Adjust roller to obtain a clearance of 0.5 ± 0.1 mm (0.0197 ± 0.0039 in) between roller and RAT leg.

(b) Safety locknut (26) with cotter pin.

After SB 29-025 For A/C 001-004,

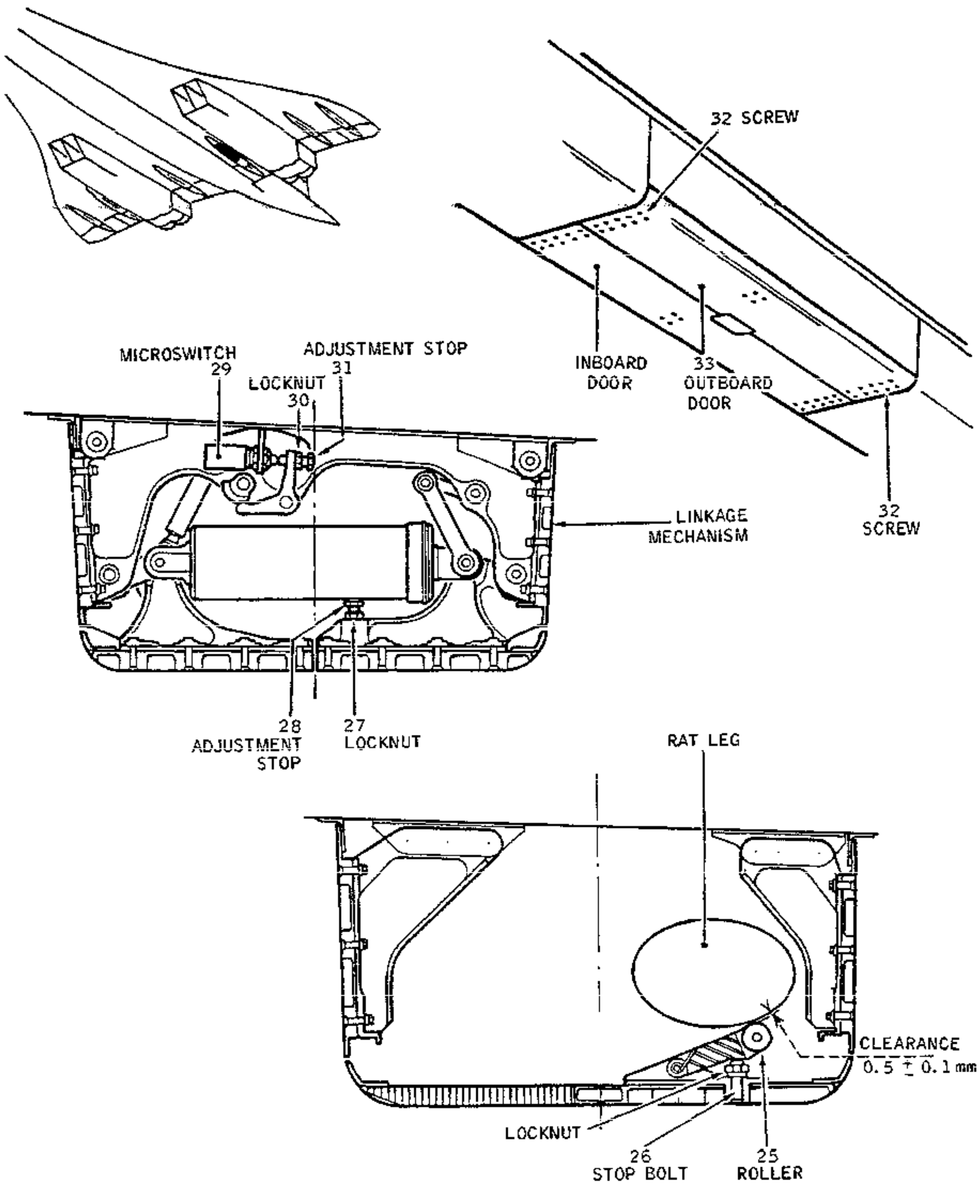
(4) Adjust roller (25).

(a) Adjust roller (25) to obtain a clearance of 0.5 ± 0.1 mm (0.0197 ± 0.0039 in.) between roller and RAT leg. Adjust by screwing stop bolt (26) in or out.

(b) Fully tighten locknut against stop bolt (26), and wirelock (Ref. 20-21-13).

(5) Adjust microswitch (29).

(a) Remove safety clips and tags and re-set the following circuit breaker :



CMA 29 24 21 4 AEMO

Adjustment of RAT Stowage Bay Doors
Figure 403

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
RAT IND No.2 CART SUP	3-213	M 762	B10

(b) Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing).

(c) Set adjustment stop (31) so that RAT warning light on Flight Engineer's CONTROL RAT panel comes on.

(d) Fully tighten locknut (30) and wirelock.

(e) Open door by means of access device E920151000 and make certain that RAT warning light goes off. If the warning light does not go off, further adjust the stop.

(f) Trip circuit breaker M762, panel 3-213, Map Ref B10.

(g) De-energize the aircraft electrical network and disconnect electrical ground power unit (Ref. 24-41-00, Servicing).

(6) Install outboard door and fully tighten screws (32) to secure door to attachment fittings. Attach bonding strip to door.

(7) Align borings of adjustable link eye end and door central hinge fitting fork end. Install bolt (17), washer (18). Tighten nut (19) and safety with cotter pin.

G. Close-Up

(1) Remove safety clips and tags, and re-set the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
RAT TEST No.1 CART SUP	1-213	M 761	R17
RAT IND No.2 CART SUP	3-213	M 762	B10

(2) Close doors 551GB and 551FB, and remove access device E920151000.

(3) Remove access platforms.

Printed in England

INDICATING AND MONITORING - DESCRIPTION AND OPERATION

1. General

A. The various indicating and monitoring instruments are grouped on HYDRAULIC MANAGEMENT, CONTROL RAT and GROUND HYD CHECK OUT panels at the 3CM'S station.

They indicate :

- A drop in pressure in any of the pumps
- The pressure in each system
- A drop in reservoir pressurization air pressure
- Hydraulic fluid overheating
- Hydraulic fluid temperature
- Start-up of ground pressurization electric pumps
- RAT ejection

B. A warning light located on the master warning display panel and an aural warning (single stroke gong) complete the indicating system, and operate with the associated warning lights to show :

- A drop in pressure in any of the pumps
- A drop in hydraulic fluid level in any of the reservoirs
- Hydraulic fluid overheating in any of the reservoirs

C. Magnetic indicators show :

- The position of the hydraulic shut-off valves
- The pressurization or depressurization of the pumps.

Printed in England

PRESSURE - DESCRIPTION AND OPERATION

1. General

A. Green, Blue and Yellow Hydraulic Pump Pressure
R ON A/C 001-006 (Ref. Fig. 001 and 002)
R ON A/C 007-007 (Ref. Fig. 001A and 002A)

Each pump delivers hydraulic fluid at a pressure of 4000 psi (275 bars).

A low pressure switch preset to 2030 psi (140 bars) is located on the delivery line of each pump.

When delivery pressure of the Green or Blue pumps falls below 2030 psi (140 bars) the pressure switch closes and:

- Illuminates the associated L/PRESS warning light on the 3CM's HYDRAULIC MANAGEMENT panel
- Illuminates the HYD warning light on the master warning display panel
- Triggers the aural warning gong (single stroke).

The Yellow system pump must be pressurized to enable the Yellow pressure switch to provide the same functions.

B. Green, Blue and Yellow System Pressure
R ON A/C 001-006 (Ref. Fig. 001)
R ON A/C 007-007 (Ref. Fig. 001A)

A pressure transmitter mounted in parallel to the power flight control unit (PFCU) electro-hydraulic selector supply line transmits indications of the pressure in each system to an indicator on the 3CM's HYDRAULIC MANAGEMENT panel.

The transmitter comprises essentially a BOURDON tube, which, under the effect of pressure rotates an electro-magnet assembly attached to its end.

The impedance of this assembly varies and unbalances a Wheatstone bridge inside the indicator.

The unbalanced bridge current energizes a ratiometer, the reading of which is proportional to the pressure.

Power supply to the indicator is 26 V a.c., 400 Hz.

The appearance of a cross-hatched flag on the front of the dial indicates that power is no longer supplied to the indicator.

PRINTED IN ENGLAND

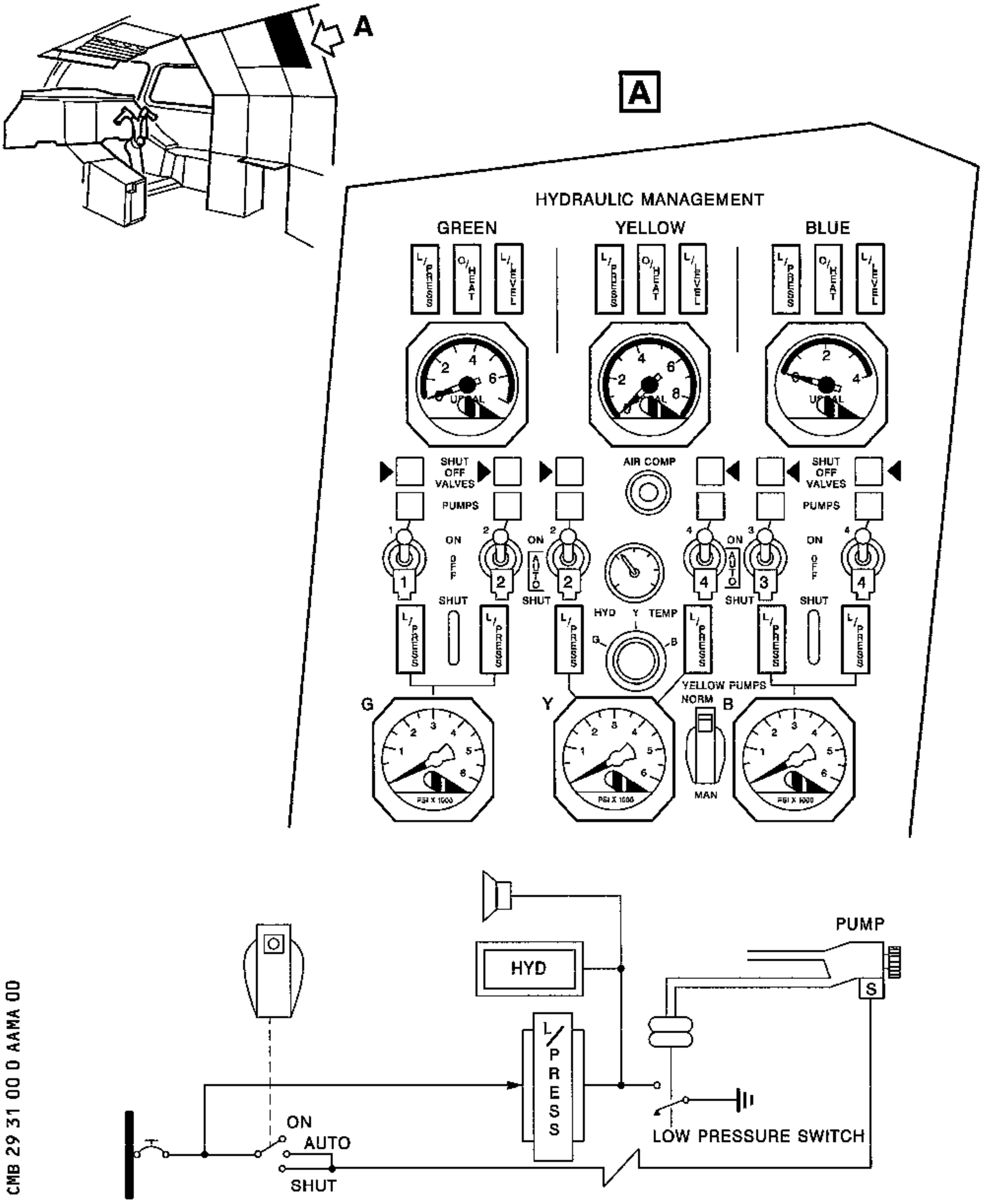
C. Green, Blue and Yellow Hydraulic Tank Pressurization (Ref. Fig. 003)

Each hydraulic tank is pressurized to 65 psi (4.5 bars).

A direct reading pressure indicator mounted on each tank indicates the air pressure.

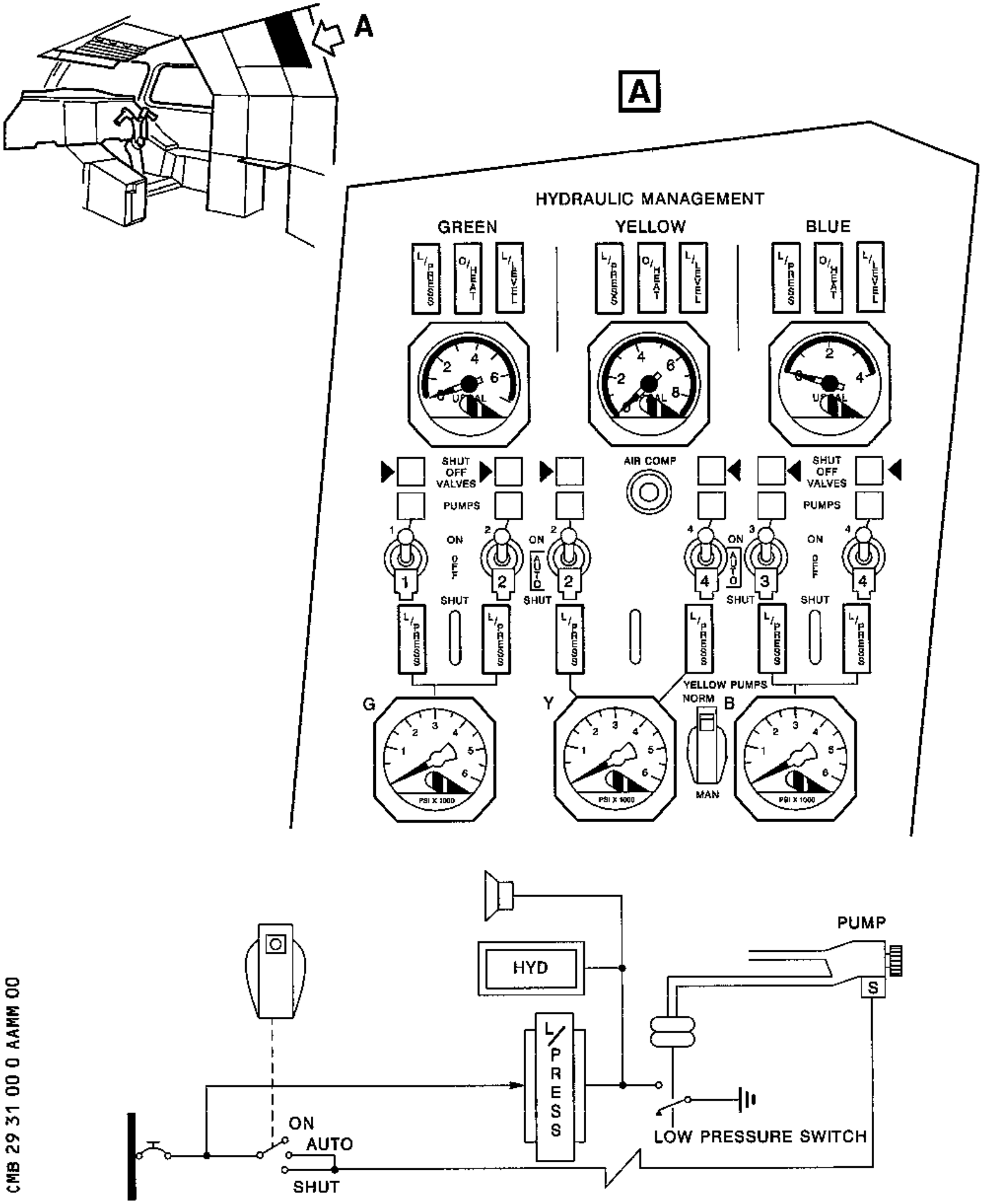
A low pressure switch mounted on the tank and preset to
R 29 ± 1.45 psi (2 ± 0.1 bars) illuminates, when closed, an L/PRESS warning light on the HYDRAULIC MANAGEMENT panel at the Flight Engineer's station.

PRINTED IN ENGLAND



CMB 29 31 00 0 AAMA 00

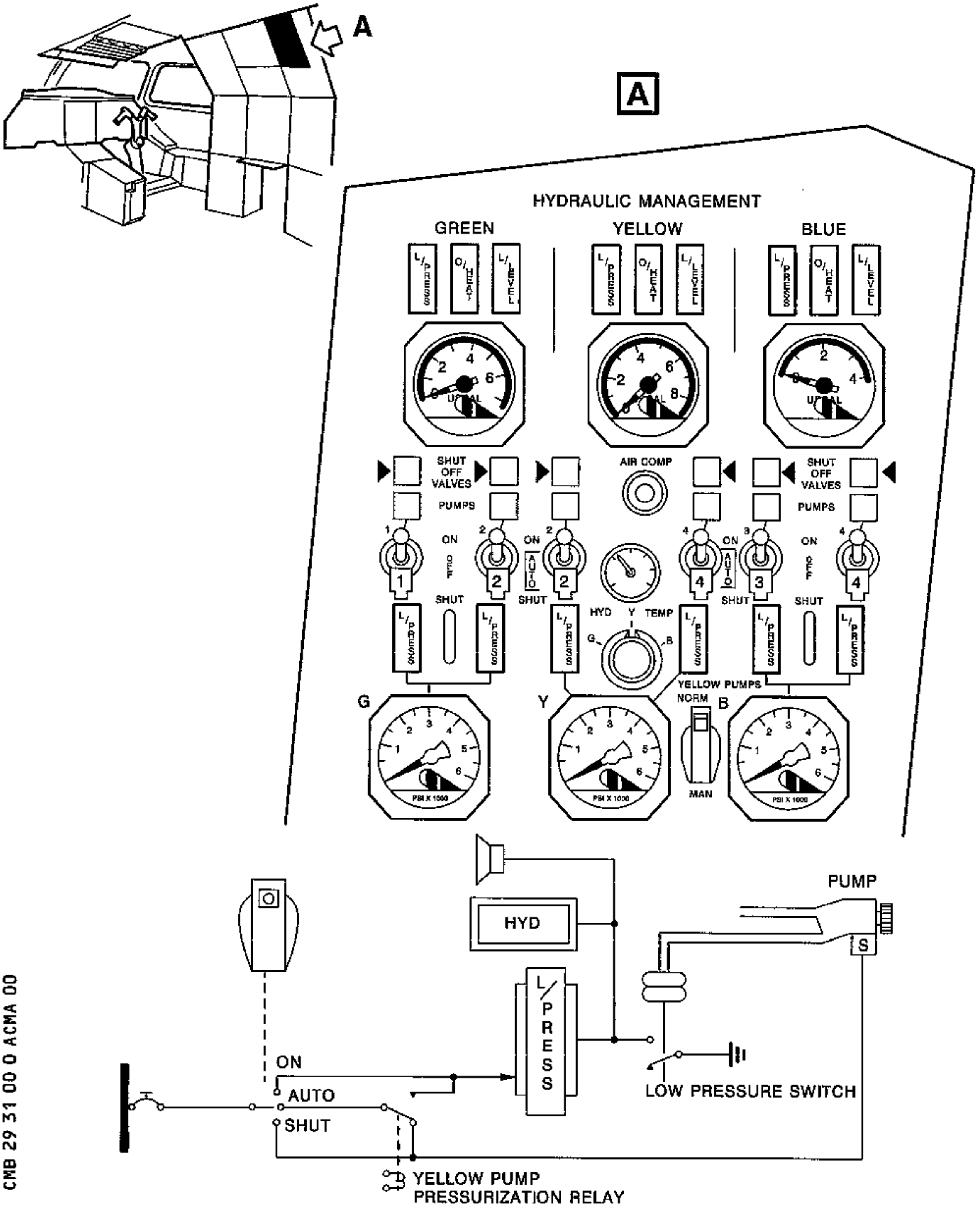
R Pressure Monitoring - Green and Blue System Pumps
Figure 001



Pressure Monitoring - Green and Blue System Pumps
Figure 001A

PRINTED IN ENGLAND

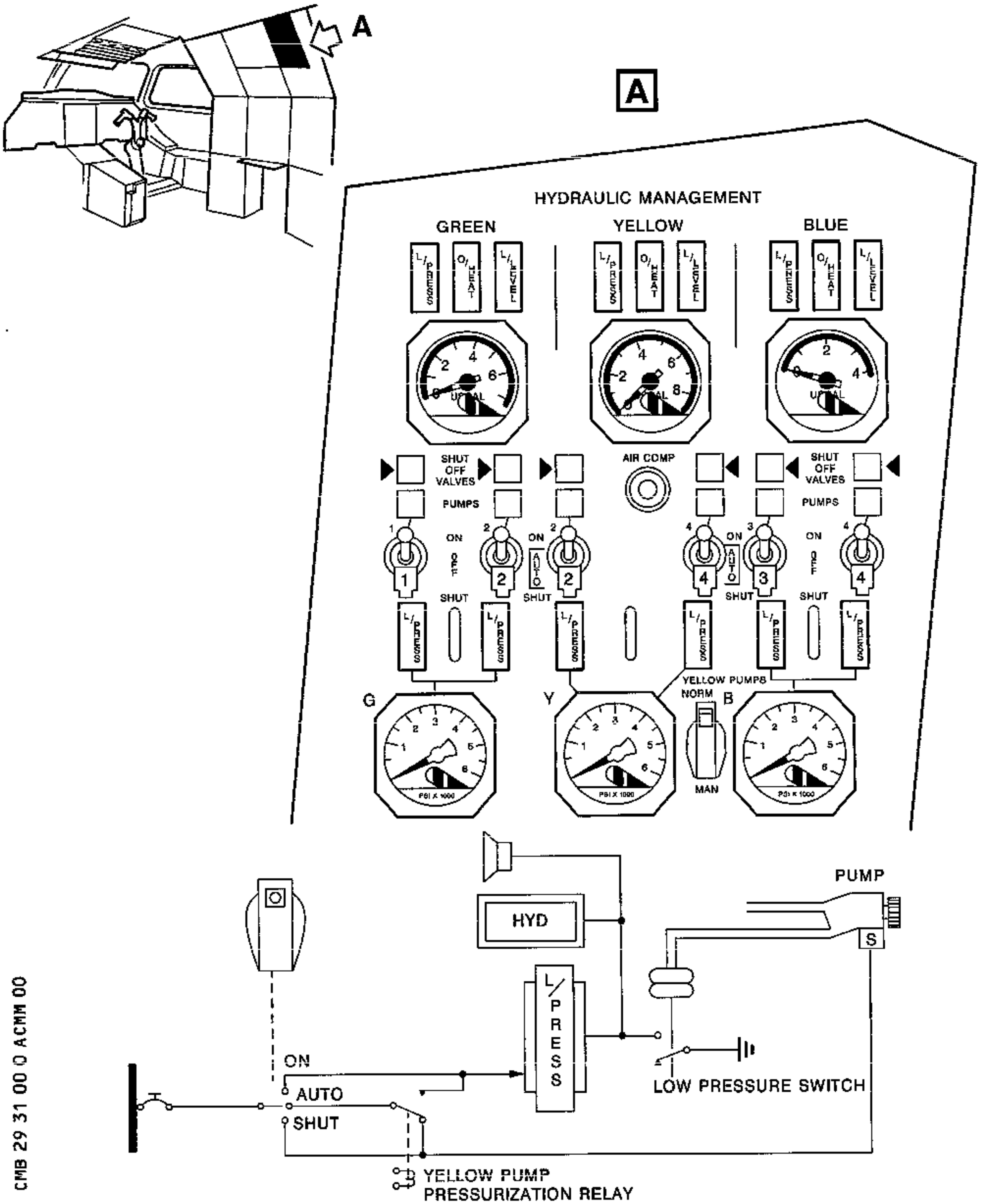
CMB 29 31 00 0 AAMM 00



Pressure Monitoring - Yellow System Pumps
Figure 002

PRINTED IN ENGLAND

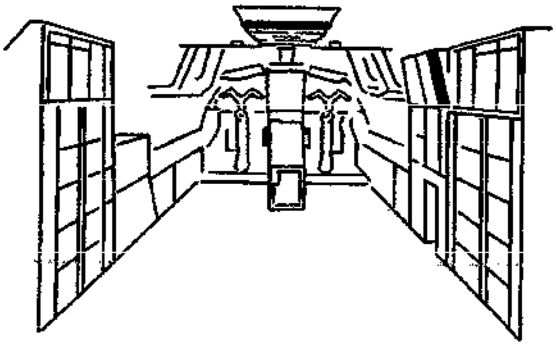
CMB 29 31 00 0 ACMA 00

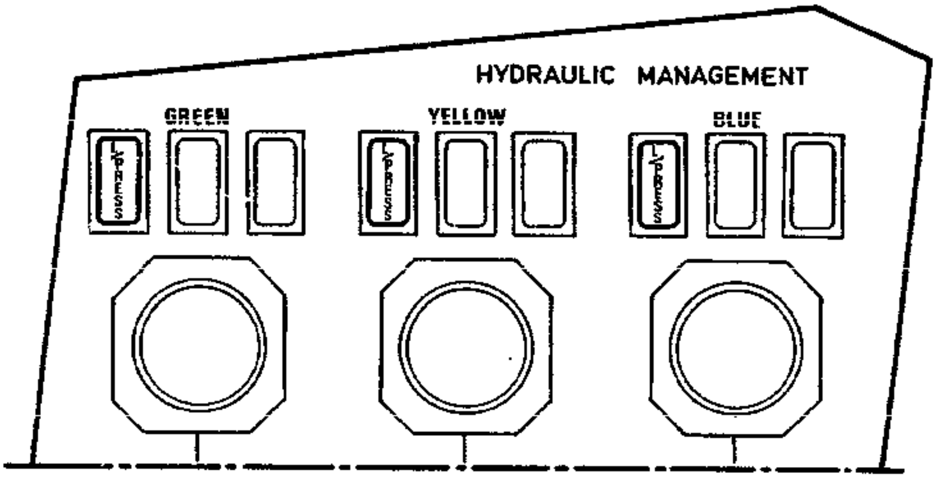


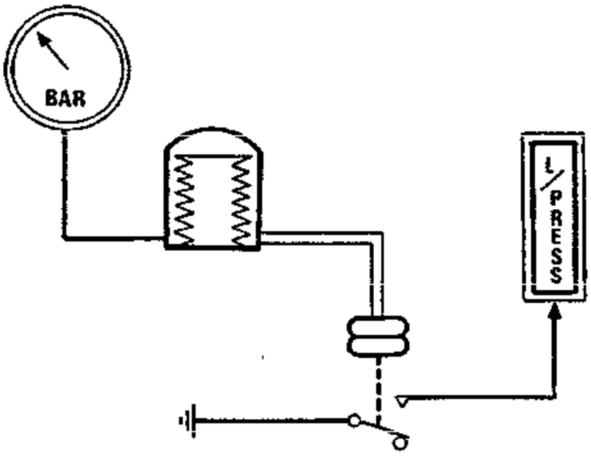
Pressure Monitoring - Yellow System Pumps
Figure 002A

PRINTED IN ENGLAND

CMB 29 31 00 0 ACMM 00







CMA 29 31 00 0 ACMO

Hydraulic Tank Pressurization Monitoring
Figure 003

R 1. Functional Test of Hydraulic Tank Pressurization Indicating

A. Reason for the Job

R To check for correct operation of hydraulic tank air pressure drop indicating.

B. Equipment and Materials

DESCRIPTION	PART NO.
Electrical Ground Power Unit	
R Hydraulic Tank Pressurizing Equipment (Air Bottle with Pressure Reducing Valve)	
Access Platforms - 9 ft. 11 in. (1.80 metres)	

C. Prepare

R (1) Open access doors 153BB.

R (2) Check fluid level in the three tanks.

R (3) Remove safety pins from tank depressurization valves
R and depressurize the three tanks by rotating valve knurled knob.

R (4) Connect tank pressurizing equipment to ground connector (0191) in zone 153.

(5) Make certain that the following circuit breakers are set :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
YELL LL LT O/HEAT IND	15-215	G 261	C 9
R BLUE GRN LL LP O/HEAT IND	15-216	G 262	D19
GRN LL LP O/HEAT IND		G 263	D20

(6) Connect electrical ground power unit and energize

Printed in England

R R the aircraft electrical network (Ref. 24-41-00, Servicing).

D. Test

(1) Pressure in the hydraulic systems must be zero, to avoid any unwanted variation in level following operation of hydraulic services.

(2) On Flight Engineer's HYDRAULIC MANAGEMENT panel, GREEN-YELLOW and BLUE L/PRESS pressurization caption lights must be illuminated.

R (3) Close the depressurization valve on each of the three tanks.

R R R R (4) Slowly pressurize tanks (Ref. 29-13-00, Servicing). Pressurization must cause the L/PRESS caption lights to go off when pressure rises to 39.16 ± 2.9 psi (2.7 ± 0.2 bars) read on the pressure gauge mounted on each tank.

R R (5) Slowly reduce pressure in each tank by turning the depressurization valve knurled knob. Check that L/PRESS caption lights on Flight Engineer's HYDRAULIC MANAGEMENT panel come on when pressure drops to 29 ± 2.9 psi (2 ± 0.1 bars).

E. Close-Up

R R (1) De-energize the aircraft electrical network and disconnect electrical ground power unit (Ref. 24-41-00, Servicing).

(2) Disconnect pressurizing equipment.

R (3) Close depressurization valve on the three tanks, and secure with safety pins.

(4) Close access doors.

(5) Remove access platforms.

LEVEL - DESCRIPTION AND OPERATION

1. General

A transmitter and gauge assembly attached to the lower flange
R of each hydraulic tank allows :

R - Direct quantity reading at the tank.
- Display of quantity readings on the HYDRAULIC MANAGEMENT panel at the Flight Engineer's station.
- Indication of low level by caption lights on the HYDRAULIC MANAGEMENT panel at the Flight Engineer's station.
R - Evacuation of excess hydraulic fluid from the tank.

R The variations in fluid volume in the tank caused by varying requirements, cause the bellows to move.

A cable attached to the upper part of the bellows transmits the movement to a capstan.

The capstan rotates the main spindle of the transmitter and gauge assembly through a reduction gear.

R 2. Direct Reading Gauge on the Tank

The gauge pointer is attached to the end of the main spindle of the transmitter and gauge assembly.

3. Repeater Indicator at the Flight Engineer's Station

The transmitter and indicator constitute a synchro-assembly, which comprises :

- A synchro-transmitter, the rotor of which is mounted on the main spindle of the transmitter and gauge assembly.
- An indicator receiving the signals from the synchro-transmitter.

The transmitter and indicator rotors are powered by 26 V, 400 Hz.

A cross-hatched flag appearing on the face of the dial indicates that no power is supplied to the indicator.

4. Low Level Indicating at the Flight Engineer's Station

A camshaft driven by the central spindle controls two microswitches attached to an adjustable mounting around the spindle. Rotation of the camshaft operates the microswitches.

A. Green and Blue Hydraulic Tanks

When the minimum level in the Green and Blue tanks reaches respectively 1.8 and 1.2 US gal (7 and 4.5 litres, 1.5 and 1 Imp gal), the corresponding microswitch :

- Illuminates its associated L/LEVEL caption light on the Flight Engineer's HYDRAULIC MANAGEMENT panel.
- Illuminates HYD caption light on the master warning panel.
- Trips the aural warning single-stroke gong.

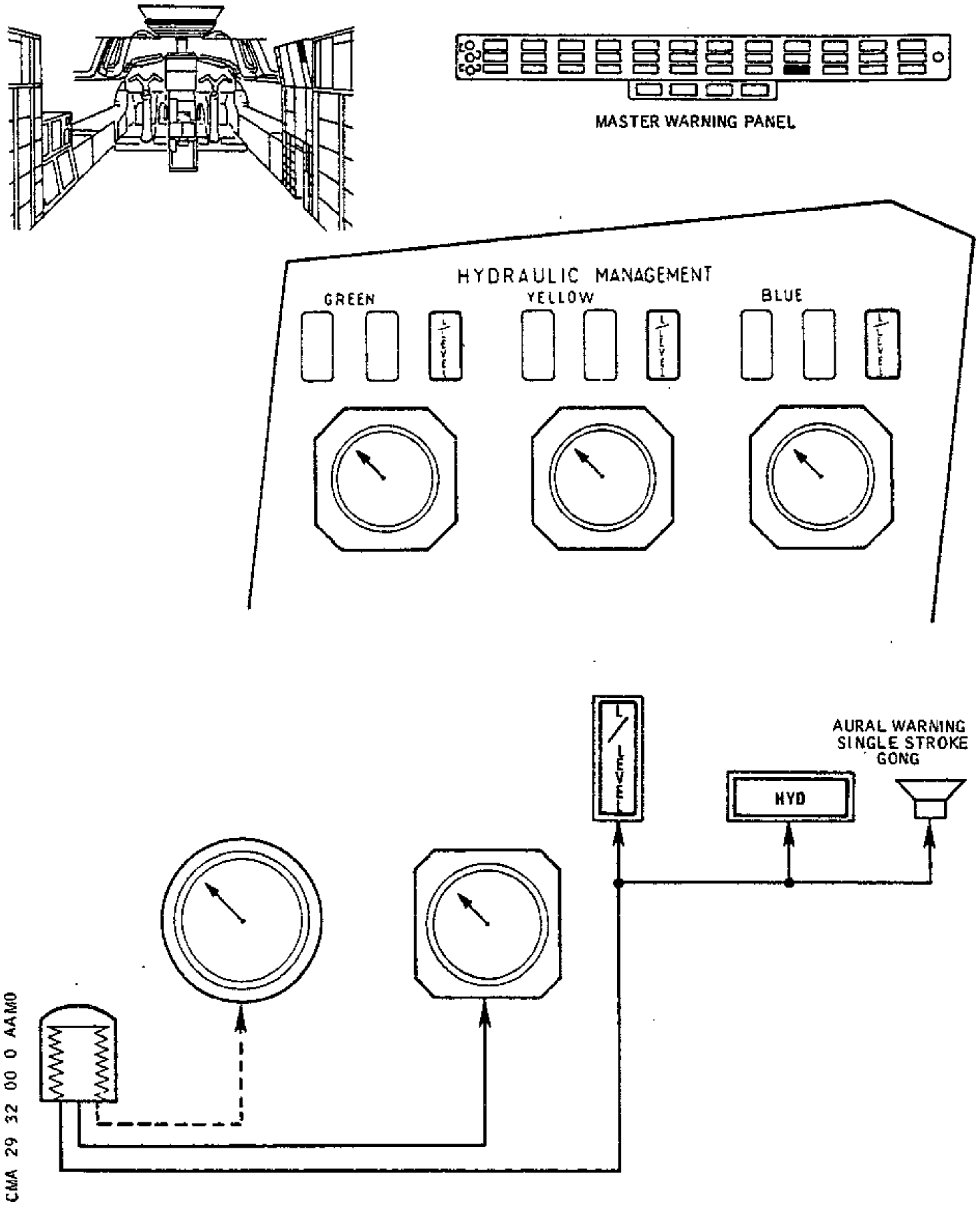
The second microswitch, activated when the minimum level is reached, trips the air intake HYD warning.

R

After SB 29-050 For A/C 001-007,

B. Yellow Hydraulic Tank

- When tank fluid level is below 3.4 US Gal (2.9 Imp. gal, 13 litres) the first microswitch is activated and assumes the same functions as the Green and Blue tank microswitches. It also shuts off the standby supply to the Yellow/Green or Yellow/Blue servo control units, and Yellow pressure supply to the emergency braking system with anti-skid.
- When the tank fluid level is below 2.2 US Gal (1.9 Imp. gal, 8.5 litres), the second microswitch is activated and shuts off the hydraulic supply to the engine air intake spill doors.



Hydraulic Tank Level Monitoring
Figure 001

LEVEL - TROUBLE SHOOTING

WARNING : MAKE CERTAIN THAT THE POSITIONS OF NOSE AND MAIN GEAR DOORS CORRESPOND WITH THE ACTUAL POSITIONS OF THE RESPECTIVE OPERATING HANDLES.
HANDLE LOCKED, INDICATOR PLATE SHOWING WHITE : DOORS CLOSED.
HANDLE LOCKED, INDICATOR PLATE SHOWING RED : DOORS OPEN.

MAKE CERTAIN THAT THE LANDING GEAR POSITION INDICATED ON THE GEARS POSITION INDICATING UNIT CORRESPONDS WITH THE ACTUAL POSITION OF THE LANDING GEAR.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE, MAKE CERTAIN THAT THE TRAVEL RANGES OF THE CONTROL SURFACES ARE CLEAR.

BEFORE PRESSURIZING HYDRAULIC SYSTEMS, CHECK THAT ALL CONTROLS ARE SET TO CORRESPOND WITH THE ACTUAL POSITION OF THE SERVICES THEY OPERATE.

MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

OBSERVE THE ELECTRICAL SAFETY PRECAUTIONS DESCRIBED IN 24-00-00 SERVICING.

1. General

The following trouble shooting procedures are intended to enable faults found in hydraulic level monitoring circuit to be quickly rectified.
The defects can be isolated with the aid of trouble shooting procedures and traced through OK and NOT OK paths to the appropriate charts or other specified rectification action as may be required. If a defect occurs, perform the appropriate rectification action, then repeat the operation at which the defect was encountered to ensure that the operation is OK.
Bracketed numbers in the procedures and charts indicate items on the component identification table (Ref. Table 101). The table provides information including component location required for rectification.
All procedures dealing with trouble shooting are based on the assumption that electrical wiring is serviceable, all associated circuit breakers are set and electrical power is available, unless otherwise stated. If the fault is not rectified, check the wiring in accordance with the Wiring Diagram Manual (Ref. Table 101).

2. Prepare

A. Equipment and Materials

DESCRIPTION	PART NO.
Electrical Ground Power Unit	
Repleneshing Unit-Hydraulic System Reservoir	E920129000
Ground Power Unit-Hydraulic, Power and Preliminary Testing	EMH398E
Drain Hose-Hydraulic Tanks	D925190000
Container	
Access Platform 9 ft 8 in (2.960 m)	
Drainage Equipment	E920147000

B. Make certain that the following circuit breakers are set :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
INT. 1 MAIN HYD SUP	1-213	1K1950	D 9
INT. 2 STBY HYD SUP		2K1960	E 9
INT. 4 IND SUP		4E 531	F 9
INT. 3 IND SUP		3E 531	G 9
INTERFACE UNIT 1A/2B SUP		1K1976	H 9
AUDIO WARN SYS SUP 1		W 371	M21
MWS SUP 1		W 252	N21
RH UC WHEIGT SW "A" SYS SUP		G 295	M18
RELAY JACK HYD SEL IND SUP		C 281	N17
PFC IND		C 287	N18
YELL/GRN GRN FAIL P.F.C RELAY JACK		C 285	P16
YELL/BLUE BLUE FAIL PFC RELAY JACK		C 286	P17
YELL LL. PFC RELAY JACK		C 288	P18
INT 1 RAMP-SPILL POSN IND	2-213	1E 541	E14
INT 4 RAMP-SPILL POSN IND		4E 541	F14
YELL L. LEVEL P.F.C RELAY JACK	3-213	C 282	A 8
YELL/GREEN GRN FAIL P.F.C. RELAY JACK		C 283	A 9
YELL BLUE BLUE FAIL P.F.C RELAY		C 284	A10

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
JACK			
INT 2 RAMP SPILL POSN IND	4-213	2E 541	E17
INT 3 RAMP SPILL POSN IND		3E 541	F17
INT 4 ST BY HYD SUP	5-213	4K1960	A 6
INT 1 IND SUP		1E 531	C 6
INT 2 IND SUP		2E 531	C 7
AUDIO WARN SYS SUP 2		W 372	C17
INTERFACE UNIT 3A/4B SUP		3K1976	D 6
MWS SUP 2		W 251	D15
INT 3 MAIN HYD SUP		3K1950	A 7
GRN TANK CONTENTS IND	13-215	D 41	E 8
BLUE TANK CONTENTS IND		D 43	F 8
YELL TANK CONTENTS IND	13-216	D 42	B12
INT 2 MAIN HYD SUP	15-215	2K1950	B18
INT 3 STBY HYD SUP		3K1960	C18
INTERFACE UNIT 2A/1B. SUP		2K1976	D18
YELL L.L L.P O/HEAT IND		G 261	C 9
NOSE WHEEL STEERING IND		G 92	B 6

**ON A/C ALL

R After SB 32-057 For A/C 001-003,

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
WHEEL BRAKE "A" SYS CONT O/LOAD IND	15-215	G 131	B 7
WHEEL BRAKES TEST IND & SUP		G 189	C 6
WHEEL BRAKE "B" SYS CONT	15-216	G 132	B18

**ON A/C ALL

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
INT 4 MAIN HYD SUP	15-216	4K1950	A 8
INT 1 STBY HYD SUP		1K1960	B 8
INTERFACE UNIT 4A/3B SUP		4K1976	D 8
ROOF PNL L.T TEST. SUP		L1002	D13
BLUE L.L L.P O/HEAT IND		G 262	D19
GRN L.L L.P O/HEAT IND		G 263	D20
NOSE WHEEL STEERING SUP		G 93	A18

C. On overhead panel, on flight control unit, make certain that

BLUE INVERTER and GREEN INVERTER switches are in OFF position. On SERVO CONTROLS unit, make certain that the selector switches are in NORMAL position.

D. At Flight Engineer's station, on AIR INTAKE panel, make certain that :

- RAMP SPILL MASTER switches are in AUTO position.
- ~~HYD switches are in AUTO position.~~
- LANE selector switches are in AUTO A position.

E. connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing).

3. Trouble Shooting : Green and Blue Hydraulic Tank Level

```
*************************************************
* Proceed with preparation as described in Para. 2. *
* On HYDRAULIC MANAGEMENT panel, check Green Or     *
* Blue hydraulic tank level indicating.             *
* L/LEVEL warning light is extinguished.            *
* Quantity indicator displays correct level.        *
*************************************************
    ||    |      ----------------------------------------------------
    OK    NOT OK----| Warning flag appears on quantity indicator.    |
    ||    |         | Ref. Chart 101.                                |
    ||    |      ----------------------------------------------------
    ||    |      ----------------------------------------------------
    ||    |         | L/LEVEL warning light is illuminated.          |
    OK    NOT OK----| Quantity indicator displays level lower than   |
    ||    |         | warning level. Ref. Chart 102.                 |
    ||    |      ----------------------------------------------------
    ||    |      ----------------------------------------------------
    ||    |         | L/LEVEL warning light is extinguished.         |
    OK    NOT OK----| Quantity indicator displays level lower than   |
    ||    |         | warning level. Ref. Chart 103.                 |
    ||    |      ----------------------------------------------------
    ||    |      ----------------------------------------------------
    ||    |         | L/LEVEL warning light illuminated.             |
    OK    NOT OK----| Quantity indicator displays correct level      |
    ||              | Replace removable electric sub-assembly of     |
    ||              | quantity transmitter/direct reading indicator  |
    ||              | [13] or [15].                                  |
    ||           ----------------------------------------------------
*************************************************
* On master warning display panel, press and release*
* HYD warning light to cancel warning.              *
* On HYDRAULIC MANAGEMENT panel, press then release *
* L/LEVEL warning light.                            *
* HYD warning light illuminates                     *
* L/LEVEL warning light illuminates when pressed.   *
*************************************************
    ||    |      ----------------------------------------------------
    ||    |         | L/LEVEL warning light illuminates.             |
    OK    NOT OK----| HYD warning light does not illuminate.         |
    ||    |         | (Ref. 33-15-00, Trouble Shooting)              |
    ||    |      ----------------------------------------------------
    ||    |      ----------------------------------------------------
    OK    NOT OK----| L/LEVEL warning light does not illuminate.     |
    ||    |         | HYD warning light illuminates.                 |
    ||    |         | Ref. Chart 104.                                |
    ||    |      ----------------------------------------------------
```


Printed in England

```
   ||    |          -------------------------------------------------
   ||    |         | L/LEVEL warning light does not illuminate.      |
   OK   NOT OK----| HYD warning light does not illuminate.          |
   ||              | Replace L/LEVEL warning light [9] or [8].       |
   ||               -------------------------------------------------
*****************************************************
* Open access door 153BB, apply 29 psi (2bars)      *
* pressure to Green or Blue hydraulic tank          *
* (Ref. 29-13-00, Servicing)                        *
* Install drainage equipment E920147000. Connect    *
* replenishing unit to ground connector (144) in    *
* zone 153 for Green tank or to connector (243) in  *
* in zone 153 for Blue tank.                        *
* Connect drain hose D925190000 to Green or Blue    *
* tank drain valve.                                 *
* Slowly replenish tank until fluid overflows       *
* through drain hose.                               *
*****************************************************
   ||    |          -------------------------------------------------
   OK   NOT OK----| Replace hydraulic tank [16] or [17].            |
   ||               -------------------------------------------------
*****************************************************
* Pressurize Green or Blue system (Ref. 29-11-00 or *
* 29-12-00, Servicing).                             *
* Drain hydraulic tank down to warning level.       *
* L/LEVEL warning light illuminates on HYDRAULIC    *
* MANAGEMENT panel.                                 *
* HYD warning light illuminates on master warning   *
* display panel and single-stroke gong sounds.      *
* Quantity indicator displays warning level.        *
* HYD warning light illuminates on Flight Engineer's*
* AIR INTAKE panel.                                 *
*****************************************************
   ||    |          -------------------------------------------------
   ||    |         | L/LEVEL warning light does not illuminate.      |
   ||    |         | HYD warning light on master warning display     |
   ||    |         | panel does not illuminate and single-stroke     |
   OK   NOT OK----| gong does not sound.                            |
   ||    |         | Quantity indicator displays warning level.      |
   ||    |         | HYD warning light on AIR INTAKE panel does not  |
   ||    |         | illuminate.                                     |
   ||    |         | Replace removable electric sub-assembly of      |
   ||    |         | quantity transmitter/direct reading indicator   |
   ||    |         | [13] or [15].                                   |
   ||    |          -------------------------------------------------
   ||    |
   ||    |
   ||    |
```

```
  ||    |          ------------------------------------------------------
  ||    |         | L/LEVEL warning light illuminates.                   |
  ||    |         | HYD warning light on master warning display          |
  OK    NOT OK----| panel illuminates.                                   |
  ||    |         | Quantity indicator displays warning level.           |
  ||    |         | HYD warning light AIR INTAKE panel does not          |
  ||    |         | illuminate. Ref. Chart 105.                          |
  ||    |          ------------------------------------------------------
*****************************************************
* Stop hydraulic system pressurization. Replenish   *
* hydraulic tank (Ref. 12-12-29).                   *
* Disconnect hydraulic ground power unit and reple- *
* nishing unit and cap ground connectors.           *
* Remove drain hose and drainage equipment.         *
* Clean work area and check that no trace of fluid  *
* remains.                                          *
* Make certain that working area is clean and clear *
* of tools and miscellaneous items of equipment.    *
* Close access panels and doors.                    *
* Remove access platforms.                          *
*****************************************************
```

4. Trouble Shooting : Yellow Hydraulic Tank Level

```
*****************************************************
* Proced with preparation as described in Para. 2.  *
* On HYDRAULIC MANAGEMENT panel, check Yellow       *
* hydraulic tank level indicating.                  *
* L/LEVEL warning light is extinguished.            *
* Quantity indicator displays correct level.        *
*****************************************************
   ||   |        ----------------------------------------------
   OK   NOT OK----| Warning flag appears on quantity indicator.  |
   ||   |        | Ref. Chart 106.                             |
   ||   |        ----------------------------------------------
   ||   |        ----------------------------------------------
   ||   |        | L/LEVEL warning light is illuminated.        |
   OK   NOT OK----| Quantity indicator displays level lower than |
   ||   |        | first warning level. Ref. Chart 107.         |
   ||   |        ----------------------------------------------
   ||   |        ----------------------------------------------
   ||   |        | L/LEVEL warning light is extinguished.       |
   OK   NOT OK----| Quantity indicator displays level lower than |
   ||   |        | first warning level. Ref. Chart 108.         |
   ||   |        ----------------------------------------------
   ||   |        ----------------------------------------------
   ||   |        | L/LEVEL warning light is illuminated.        |
   ||   |        | Quantity indicator displays correct level.   |
   OK   NOT OK----| Replace removable electric sub-assembly of   |
   ||   |        | quantity transmitter/direct reading indicator |
   ||   |        | [14].                                        |
   ||   |        ----------------------------------------------
*****************************************************
* On master warning display panel, press then       *
* release HYD warning light to cancel warning.      *
* On HYDRAULIC MANAGEMENT panel, press then release *
* L/LEVEL warning light.                            *
* HYD warning light illuminates.                    *
* L/LEVEL warning light illuminates when pressed.   *
*****************************************************
   ||   |        ----------------------------------------------
   ||   |        | L/LEVEL warning light illuminates.           |
   OK   NOT OK----| HYD warning light does not illuminate        |
   ||   |        | Ref. 33-15-00, Trouble Shooting.             |
   ||   |        ----------------------------------------------
   ||   |        ----------------------------------------------
   ||   |        | L/LEVEL warning light does not illuminate.   |
   OK   NOT OK----| HYD warning light illuminates.               |
   ||   |        | Ref. Chart 109.                              |
   ||   |        ----------------------------------------------
```

```
  ||    |
  ||    |          ------------------------------------------------
  ||    |         |L/LEVEL warning light does not illuminate HYD|
  OK    NOT OK----|warning light does not illuminate. Replace   |
  ||              |L/LEVEL warning light [7]).                  |
  ||              |---------------------------------------------|

****************************************************************
*Open access door 153BB, apply a 29 psi (2bars) pressure to Yel-*
*low hydralic tank (Ref. 29-13-00, Servicing).                  *
*Install drainge equipment E920147000. Connect replenishing     *
*unit to ground connector (341) in zone 153.                    *
*Connect drain hose D925190000 to Yellow tank drain valve.      *
*Slowly replenish tank until fluid overflows through drain hose *
****************************************************************

  ||    |
  ||    |          ----------------------------------------------
  OK    | NOT ----|Replace hydraulic tank [18].                 |
  ||    |         |---------------------------------------------|
***************************************************************
*Pressurize Yellow hydraulic system. On SERVO CONTROLS UNIT,   *
*place lower selector switch in YELLOW GREEN position.         *
*Drain hydraulic tank to first warning level L/LEVEL warning   *
*level L/LEVEL warning light illuminates.                      *
*HYD warning light on master warning panel illuminates and sin-*
*gle stroke gong sounds.                                       *
*Quantity indicator displays first warning level.              *
*On SERVO CONTROLS unit, the green indicator lights below BLUE *
*ONLY placard remain illuminated, green indicator lights below *
*YELLOW GREEN placard extinguish and indicator lights under YEL*
*LOW BLUE placard must illuminate.                             *
***************************************************************
 ||     |
 ||     |          ---------------------------------------------|
 OK     NOT OK----|L/LEVEL warning light does not illuminate.   |
 ||     |         |HYD warning light does not illuminate on mas|
 ||     |         |ter warning display panel.                   |
 ||     |         |Quantity indicator displays first warning    |
 ||     |         |level. On SERVO CONTROLS unit,green indica-  |
 ||     |         |tor lights, below YELLOW GREEN placard       |
 ||     |         |and below YELLOW BLUE placard do not illumi-|
 ||     |         |nate.                                        |
 ||     |         |- Replace removable electric sub-assembly of|
 ||     |         |  quantity transmitter/direct reading in-    |
 ||     |         |  dicator [14].                              |
 ||     |         |---------------------------------------------|
```

```
R  **ON A/C  001-006,
      ||    |
      ||    |         -------------------------------------------------
      ||    |         | L/LEVEL warning light does not illuminate.    |
      ||    |         | HYD warning light does not illuminate on master|
      OK    NOT OK----| warning display panel.                        |
      ||    |         | Quantity indicator displays first warning level|
      ||    |         | On SERVO CONTROLS unit, green indicator lights |
      ||    |         | below YELLOW GREEN placard extinguish.         |
      ||    |         | Replace diode [19].                            |
      ||    |         -------------------------------------------------
      ||    |         -------------------------------------------------
      ||    |         | L/LEVEL warning light illuminates.             |
      ||    |         | HYD warning light illuminates on master warning|
      ||    |         | display panel.                                 |
      OK    NOT OK----| Quantity indicator displays first warning level|
      ||              | On SERVO CONTROLS unit, green indicator lights |
      ||              | below YELLOW GREEN placard do not extinguish.  |
      ||              | Ref. Chart 110.                                |
      ||              -------------------------------------------------
```

R After SB 32-057 for A/C 001-003,

```
 ||     |
 ||     |              |-----------------------------------------------|
 ||     |              |L/LEVEL warning light does not illuminate.     |
 ||     |              |HYD warning light does not illuminate on mas   |
 ||     |              |ter warning display panel.                     |
 ||     |              |Quantity indicator displays first warning      |
 OK     NOT OK---------|level. On SERVO CONTROLS unit, green indica-   |
 ||     |              |tor lights below YELLOW GREEN placard ex-      |
 ||     |              |tinguish and below YELLOW BLUE placard il-     |
 ||     |              |luminate. Replace diode [19].                  |
 ||     |              |-----------------------------------------------|

 ||     |
 ||     |              |-----------------------------------------------|
 ||     |              |L/LEVEL warning light illuminates.             |
 ||     |              |HYD warning light illuminates on master war-   |
 ||     |              |ning display panel.                            |
 OK     NOT OK---------|Quantity indicator displays first warning      |
 |      |              |level. On SERVO CONTROLS unit, green indi-     |
 ||     |              |cator lights below YELLOW GREEN placard do     |
 ||     |              |not extinguish, below YELLOW BLUE remain ex-   |
 ||     |              |tinguished Ref. Chart 110.).                   |
 ||     |              |-----------------------------------------------|

 ||     |              |-----------------------------------------------|
 ||     |              |L/LEVEL warning light illuminates.             |
 ||     |              |HYD warning light illuminates on master war-   |
 ||     |              |ning display panel. Quantity indicator dis-    |
 ||     |              |plays first warning level.                     |
 OK     NOT OK---------|On SERVO CONTROLS unit, green indicator        |
 ||     |              |lights below YELLOW GREEN placard extinguish   |
 ||     |              |below YELLOW BLUE placard do not illuminate    |
 ||     |              |Replace SERVO CONTROLS unit C291 [23]          |
 ||     |              |-----------------------------------------------|

****************************************************************
*Press brake pedals then release : on master warning panel,    *
*BRAKE FAIL warning light must come on and remain on as long   *
*as pedals are pressed.                                        *
****************************************************************

 ||     |
 ||     |              |-----------------------------------------------|
 OK     NOT OK---------|BRAKE FAIL warning light fails to come on.     |
 ||     |              |Ref. Chart 111.                                |
 ||     |              |-----------------------------------------------|
```

```
*****************************************************
* Continue draining hydraulic tank down to second   *
* warning level.                                    *
* Quantity indicator displays second warning level. *
* HYD warning light illuminates on Flight Engineer's*
* AIR INTAKE panel.                                 *
*****************************************************
    ||    |         ------------------------------------------------
    ||    |        | Quantity indicator displays second warning     |
    ||    |        | level.                                         |
    ||    |        | HYD warning light does not illuminate on AIR   |
    OK    NOT OK---| INTAKE panel.                                  |
    ||             | - Replace removable electric sub-assembly of   |
    ||             |   quantity transmitter/direct reading indicator|
    ||             |   [14].                                        |
    ||              ------------------------------------------------
*****************************************************
* Stop hydraulic system pressurization. Replenish   *
* hydraulic tank (Ref. 12-12-29).                   *
* Disconnect hydraulic ground power unit and reple- *
* nishing unit and cap ground connectors.           *
* Remove drain hose and drainage equipment.         *
* Clean work area and check that no trace of fluid  *
* remains.                                          *
* Make certain that working area is clean and clear *
* of tools and miscellaneous items of equipment.    *
* Close access panels and doors.                    *
* Remove access platforms.                          *
* NOTE : After a low level warning, flight control  *
* warning circuit must be re-armed when tank has    *
* been replenished. To do this, de-energize the air-*
* craft electrical network, or trip circuit breakers*
* C282 [28] and C288 [27].                          *
*****************************************************
```

```
***************************************
* WARNING FLAG APPEARS ON QUANTITY     *
* INDICATOR.                          *
***************************************


*******************************************************
* Open access door 153BB under fuselage.              *
* Check on tank quantity transmitter that electrical*
* connector is plugged in.                            *
*******************************************************
    ||    |
    ||    |        ---------------------------------------------------
    ||    |        | Connect electrical connector and check that     |
    OK    NOT OK----| warning flag disappears from quantity indicator|
    ||             | on HYDRAULIC MANAGEMENT panel.                  |
    ||             ---------------------------------------------------
    ||
*******************************************************
* Check circuit breaker D41 on panel 13-215, Map Ref*
* E8 or circuit breaker D43 on panel 13-215, Map Ref*
* F8.                                                 *
*******************************************************
         |                                  |
         |                                  |
         OK                              NOT OK
         |                                  |
---------------------------------  ----------------------------------
| Replace removable electric    |  | Replace circuit breaker D41 [1]|
| sub-assembly of quantity      |  | or D43 [3].                    |
| transmitter/direct reading    |  |                                |
| indicator [13] or [15].       |  |                                |
---------------------------------  ----------------------------------
```

Chart 101

```
**************************************
* L/LEVEL WARNING LIGHT ILLUMINATED. *
* QUANTITY INDICATOR DISPLAYS LEVEL  *
* LOWER THAN WARNING LEVEL.          *
**************************************


*****************************************************
* Open access door 153BB under fuselage.            *
* By means of the depressurization valve/sight glass*
* check for absence of hydraulic fluid in the air   *
* compartment                                       *
*****************************************************
    ||    |
    ||    |    ---------------------------------------------------
    OK    NOT OK----| Replace hydraulic tank [16] or [17].          |
    ||    |    ---------------------------------------------------
    ||    |
*****************************************************
* In zone 153. check de-aerator safety valve [20] or*
* [21]. Mechanical indicator is visible.            *
*****************************************************
    ||    |
    ||    |    ---------------------------------------------------
    OK    NOT OK----| Check for traces of hydraulic fluid at bleed  |
    ||                | port of de-aerator safety valve.              |
    ||             ---------------------------------------------------
---------------------------------  |       |              |
| Drain de-aerator safety valve |  |       |              |
| [20] or [21]. Check for exter-|  |       |              |
| nal leakage.                  |  |       |              |
---------------------------------  |       |              |
                                   OK      |           NOT OK
                                   |       |              |
        --------------------------------   |   ------------------------
        | Replace tank [16] or [17] and|   |   | Check for external   |
        | associated de-aerator safety |   |   | leakage.             |
        | valve.                       |   |   |                      |
        --------------------------------   |   ------------------------
                                           |
                                       NOT OK
                                           |
        ---------------------------------------------
        | Check engine nozzles (Ref. 78-00-00,      |
        | Inspection/Check).                        |
        | If one of them shows white traces, replace|
        | corresponding hydraulic fluid/Fuel heat   |
        | exchanger.                                |
        ---------------------------------------------
```

Chart 102

```
**************************************
* L/LEVEL WARNING LIGHT EXTINGUISHED.*
* QUANTITY INDICATOR DISPLAYS LEVEL  *
* LOWER THAN WARNING LEVEL           *
**************************************

*****************************************************
* Open access door 153BB under fuselage.            *
* Check level on tank-mounted direct reading indi-  *
* cator: level is correct.                          *
*****************************************************
   ||                              |
   OK                              NOT OK--------
   ||                                           |
********************************-----------------------------------
* Trip circuit breaker D41 [1]  *| Press GREEN O/HEAT warning light|
* or D43 [3].                   *| on HYDRAULIC MANAGEMENT panel.  |
* Open HYDRAULIC MANAGEMENT     *| O/HEAT warning light illuminates|
* panel and disconnect electri- *-----------------------------------
* cal connector from quantity   *  |    |      -------------------
* indicator.                    *  OK   NOT OK--| Check circuit    |
* Check quantity indicator elec-*  |            | breaker [6] or[5]|
* trical zero as follows :      *  |            -------------------
* Apply 10.2V, 400Hz voltage    *-----------------------------------
* between contact F of connector*| Replace removable electric sub- |
* and contacts C, D, E together.*| assembly of transmitter/direct  |
* Check that indicator pointer  *| reading indicator [13] or [14]  |
* comes in line with reference  *| and apply Chart 102 procedure.  |
* mark on the dial.             *-----------------------------------
********************************
   ||                     |
   OK                     NOT OK----------------
   ||                                         |
--------------------------------------------------------------------
| Replace removable electric    || Replace quantity indicator [10] |
| sub-assembly of transmitter/  || or [12].                        |
| direct reading indicator [13] ||                                 |
| or [15].                      ||                                 |
--------------------------------------------------------------------
```

Chart 103

```
*************************************
* L/LEVEL WARNING LIGHT DOES NOT    *
* ILLUMINATE                        *
* HYD WARNING LIGHT ILLUMINATES.    *
*************************************


*****************************************************
* On HYDRAULIC MANAGEMENT panel, press GREEN or BLUE*
* O/HEAT warning light: warning light illuminates.  *
*****************************************************
   ||                                      |
   ||                                      |
   OK                                  NOT OK
   ||                                      |
-------------------------------- ----------------------------------
| Replace L/LEVEL warning light| | Check circuit breaker [6] or [5]|
| [9] or [8].                  | |                                 |
-------------------------------- ----------------------------------
```

Chart 104

```
**************************************
* L/LEVEL WARNING LIGHT ILLUMINATES. *
* HYD WARNING LIGHT ILLUMINATES ON   *
* MASTER WARNING DISPLAY PANEL.      *
* HYD WARNING LIGHT DOES NOT ILLUMI- *
* NATE ON AIR INTAKE PANEL.          *
**************************************


*****************************************************
* Stop hydraulic system pressurization.             *
* HYD warning light illuminates on AIR INTAKE panel *
*****************************************************
   ||                                     |
   OK                                  NOT OK
   ||                                     |
-----------------------------------  ---------------------------------
| Replace removable electric sub-|  | Ref 71-00-41, Trouble Shooting|
| assembly of transmitter/direct |  |                               |
| reading indicator [13] or [15] |  |                               |
-----------------------------------  ---------------------------------
```

Chart 105

WARNING FLAG APPEARS ON QUANTITY INDICATOR.

Open access door 153BB under fuselage.
Check on tank quantity transmitter that electrical connector is plugged in.

NOT OK — Connect electrical connector and check that warning flag disappears from quantity indicator on HYDRAULIC MANAGEMENT panel.

OK —

Check circuit breaker D42 on panel 13-216, Map Ref. C9.

OK — Replace removable electric sub-assembly of transmitter/ direct reading indicator [14].

NOT OK — Replace circuit breaker D42 [2]

Chart 106

```
***************************************
* L/LEVEL WARNING LIGHT ILLUMINATED. *
* QUANTITY INDICATOR DISPLAYS LEVEL  *
* LOWER THAN FIRST WARNING LEVEL.    *
***************************************


*****************************************************
* Open access door 153BB under fuselage.            *
* By means of the depressurization valve/sight galss*
* check for absence of hydraulic fluid in the air   *
* compartment.                                      *
*****************************************************
   ||    |
   ||    |     ----------------------------------------------------
   OK    NOT OK----| Replace hydraulic tank [18].                  |
   ||              ----------------------------------------------------
   ||
*****************************************************
* In zone 153 check de-aerator safety valve [22].   *
* Mechanical indicator is visible.                  *
*****************************************************
   ||    |
   ||    |     ----------------------------------------------------
   OK    NOT OK----| Check for traces of hydraulic fluid at bleed  |
   ||              | port pf de-aerator safety valve.              |
   ||              ----------------------------------------------------
   ||                       |            |                 |
-----------------------------------     |            |                 |
| Drain de-aerator safety valve |     |            |                 |
| [22]. Check for external leak-|     |            |                 |
| age.                          |     |            |                 |
-----------------------------------     |            |                 |
                                       OK           |              NOT OK
                                        |            |                 |
        --------------------------------     |    -------------------------
        | Replace tank [18] and asso- |     |    | Check for external    |
        | ciated de-aerator safety    |     |    | leakage.              |
        | valve.                      |     |    |                       |
        --------------------------------     |    -------------------------
                                          NOT OK
                                             |
        ------------------------------------------------
        | Check engine nozzles (Ref. 78-00-00           |
        | Inspection/Check).                            |
        | If one of them shows white traces, replace    |
        | corresponding hydraulic fluid/Fuel heat       |
        | exchanger.                                    |
        ------------------------------------------------
```

Chart 107

```
**************************************
* L/LEVEL WARNING LIGHT EXTINGUISHED.*
* QUANTITY INDICATOR DISPLAYS LEVEL  *
* LOWER THAN FIRST WARNING LEVEL.    *
**************************************

*****************************************************
* Open access door 153BB under fuselage.            *
* Check level on tank-mounted direct reading indi-  *
* cator: level is correct.                          *
*****************************************************
   ||                               |
   OK                           NOT OK----------
   ||                                          |
********************************* ----------------------------------
* Trip circuit breaker D42 on   * | Press YELLOW O/HEAT warning    |
* panel 13-216, Map Ref. B12.   * | light on HYDRAULIC MANAGEMENT  |
* Open HYDRAULIC MANAGEMENT     * | panel.                         |
* panel and disconnect electri- * | O/HEAT warning light illumina- |
* cal connector from quantity   * | tes.                           |
* indicator D45.                * ----------------------------------
* check quantity indicator elec-*   |   |      -------------------
* trical zero as follows:       *   OK  NOT OK---| Check circuit   |
* Apply 10.2V, 400Hz voltage    *   |            | breaker [4].    |
* between contact F of connector*   |            -------------------
* and contacts C, D, E together.* ----------------------------------
* Check that indicator pointer  * | Replace removable electric sub-|
* comes in line with reference  * | assembly of transmitter/direct |
* mark on the dial.             * | reading indicator [14] and     |
********************************* | apply Chart 107 procedure.     |
   ||                 |           ----------------------------------
   ||                 |
   OK              NOT OK-----------------
   ||                                    |
--------------------------------- ----------------------------------
| Replace removable electric    | | Replace quantity indicator [11]|
| sub-assembly of transmitter/  | |                                |
| direct reading indicator      | |                                |
| [14].                         | |                                |
--------------------------------- ----------------------------------
```

Chart 108

```
************************************
* L/LEVEL WARNING LIGHT DOES NOT   *
* ILLUMINATE.                      *
* HYD WARNING LIGHT ILLUMINATES.   *
************************************


****************************************************
* On HYDRAULIC MANAGEMENT panel, press YELLOW O/HEAT*
* warning light: O/HEAT warning light illuminates.  *
****************************************************
   ||                                       |
   ||                                       |
   OK                                   NOT OK
   ||                                       |
------------------------------ ---------------------------------
| Replace L/LEVEL warning light| | Check circuit breaker [4].   |
| [7].                         | |                              |
------------------------------ ---------------------------------
```

Chart 109

Printed in England

```
*************************************
* L/LEVEL WARNING LIGHT ILLUMINATES. *
* HYD WARNING LIGHT ON MASTER WARNING*
* DISPLAY PANEL ILLUMINATES.         *
* QUANTITY INDICATOR DISPLAYS FIRST  *
* WARNING LEVEL.                     *
* ON SERVO CONTROLS UNIT, GREEN INDI-*
* CATOR LIGHTS BELOW YELLOW GREEN    *
* PLACARD DO NOT EXTINGUISH.         *
*************************************


****************************************************
* On SERVO CONTROLS unit, press YELLOW LEVEL T push-*
* button: the green indicator lights below YELLOW   *
* GREEN placard extinguish.                         *
****************************************************
   ||                                   |
   ||                                   |
   OK                                NOT OK
   ||                                   |
-------------------------------  ----------------------------------
| Replace SERVO CONTROLS unit |  | Ref. 27-34-00, Trouble Shooting.|
| C 291 [23].                 |  |                                 |
-------------------------------  ----------------------------------
```

Chart 110

R After SB 32-057 For A/C 001-003,

BRAKE FAIL warning light fails to come on.

GROUND EQUIPMENT REQUIRED	
DESCRIPTION	PART NO
Multimeter	

- Open access door 151DB under fuselage.
- Trip circuit breaker [24].
- Disconnect electrical connector from shut-off electrovalve [25]
- Reset circuit breaker [24]
- Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing).
- Pressurize Yellow system (Ref.29-21-00,Servicing).
- Fluid in Yellow tank is at or slightly below 1st warning level.
- Press brake pedals.
- Check voltage between terminals A and C on electrovalve plug.
- Release brake pedals.
- Voltage is 28V. If

OK → Replace electrovalve [25]

NOT OK → Replace relay [26]

Chart 111

ITEM No. AND DESCRIPTION	ACCESS PANEL	PANEL/ ZONE	EQUIP. IDENT.	POSITION	MANUAL REF. MAINT. TOPIC	MANUAL REF. WIRING DIAGRAM
[1] Circuit breaker		13-215	D41	E 8	24-50-00 R/I	29-32-01
[2] Circuit breaker		13-216	D42	B 12	24-50-00 R/I	29-32-01
[3] Circuit breaker		13-215	D43	F 8	24-50-00 R/I	29-32-01
[4] Circuit breaker		15-215	G261	C 9	24-50-00 R/I	29-32-01
[5] Circuit breaker		15-216	G262	D 19	24-50-00 R/I	29-32-01
[6] Circuit breaker		15-216	G263	D 20	24-50-00 R/I	29-32-01
[7] Yellow L/LEVEL warning light		3-214	G267		29-00-00 R/I	29-32-01
[8] Blue L/LEVEL warning light		3-214	G268		29-00-00 R/I	29-32-01
[9] Green L/LEVEL warning light		3-214	G269		29-00-00 R/I	29-32-01
[10] Green system quantity indicator		3-214	D44		29-00-00 R/I	29-32-01
[11] Yellow system quantity indicator		3-214	D45		29-00-00 R/I	29-32-01
[12] Blue system quantity indicator		3-214	D46		29-00-00 R/I	29-32-01

Printed in England

ITEM No. AND DESCRIPTION	ACCESS PANEL	PANEL/ ZONE	EQUIP. IDENT.	POSITION	MANUAL REF. MAINT. TOPIC	WIRING DIAGRAM
[13] Green quantity transmitter	153BB		D47		29-11-61 R/I	29-32-01
[14] Yellow quantity transmitter	153BB		D48		29-12-61 R/I	29-32-01
[15] Blue quantity transmitter	153BB		D49		29-21-61 R/I	29-32-01
[16] Green hydraulic tank	153AB		3100		29-11-61 R/I	
[17] Blue hydraulic tank	153BB		3200		29-12-61 R/I	
[18] Yellow hydraulic tank	153AB		3300		29-21-61 R/I	
[19] Diode	3-123		G279	RH Hyd. relay box		29-32-01
[20] Green system de-aerator safety valve	153BB		0196		29-00-00 S	
[21] Blue system de-aerator safety valve	153BB		0197		29-00-00 S	
[22] Yellow system de-aerator safety valve	153BB		0198		29-00-00 S	
[23] SERVO CONTROLS unit		4-211	C291		27-34-71 R/I	

R After SB 32-057 For A/C 001-003,

Printed in England

ITEM No. AND DESCRIPTION	ACCESS PANEL	PANEL/ ZONE	EQUIP. IDENT.	POSITION	MANUAL REF. MAINT. TOPIC	WIRING DIAGRAM
[24] Circuit breaker		15-215	G189	C-6	24-50-00 R/I	32-43-01
[25] Shut-off electrovalve	151DB		G145		32-43-46 R/I	
[26] Relay		3-123	G143	Relay box		32-43-01
**ON A/C ALL						
[27] Circuit breaker		1-213	C288	A18	24-50-00 R/I	27-34-01
[28] Circuit breaker		3-213	C282	A18	24-50-00 R/I	27-34-01

Component Identification
Table 101

LEVEL - ADJUSTMENT/TEST

WARNING : MAKE CERTAIN THAT THE POSITIONS OF NOSE AND MAIN GEAR DOORS CORRESPOND WITH THE ACTUAL POSITIONS OF THE RESPECTIVE OPERATING HANDLES.
HANDLE LOCKED, INDICATOR PLATE SHOWING WHITE : DOORS CLOSED.
HANDLE LOCKED, INDICATOR PLATE SHOWING RED : DOORS OPEN.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE MAKE CERTAIN THAT TRAVEL RANGES OF THE CONTROL SURFACES ARE CLEAR.

BEFORE PRESSURIZING HYDRAULIC SYSTEMS, CHECK THAT ALL CONTROLS ARE SET TO CORRESPOND WITH THE ACTUAL POSITION OF THE SERVICES THEY OPERATE.

MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

MAKE CERTAIN THAT THERE ARE NO PERSONNEL OR EQUIPMENT IN THE VICINITY OF AIR INTAKE RAMPS AND SPILL DOORS OF THE FOUR ENGINES.

1. Functional Test (Green Hydraulic Tank Level Indicating and Control)

A. Equipment and Materials

DESCRIPTION	PART NO.
Replenishing Unit - Hydraulic System Tank	E920129000
Ground Power Unit - Hydraulic-Power and Preliminary Testing	EMH398E
Ground Power Unit - Hydraulic	EMH398F
Drainage Equipment	E924170000
Hydraulic Tank Pressurizing Equipment (Air Bottle with Pressure Reducing Valve)	
Electrical Ground Power Unit	
Ground Service Telephone	

DESCRIPTION	PART NO.
Container	
Drain Hose - Hydraulic Tanks	D925190000
Access Platforms - 9 ft. 8 in. (2.960 metres)	

B. Prepare

(1) Take the precautions described in the previous WARNING paragraph.

(2) Open access door 153BB.

(3) Make certain that the following circuit breakers are set :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
INT 1 MAIN HYD SUP	1-213	1K1950	D 9
INT 2 STBY HYD SUP		2K1960	E 9
INT 4 IND SUP		4E 531	F 9
INT 3 IND SUP		3E 531	G 9
INTERFACE UNIT 1A/2B SUP		1K1976	H 9
AUDIO WARN SYS SUP 1		W 371	M21
M.W.S. SUP 1		W 252	N21
INT 1 RAMP-SPILL POSN IND	2-213	1E 541	E14
INT 4 RAMP-SPILL POSN IND		4E 541	F14
INT 2 RAMP-SPILL POSN IND	4-213	2E 541	E17
INT 3 RAMP SPILL POSN IND		3E 541	F17
INT 4 STBY HYD SUP	5-213	4K1960	A 6
INT 1 IND SUP		1E 531	C 6
INT 2 IND SUP		2E 531	C 7
AUDIO WARN SYS SUP 2		W 372	C17
INTERFACE UNIT 3A/4B SUP		3K1976	D 6
M.W.S. SUP 2		W 251	D15

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
GRN TANK CONTENTS IND	13-215	D 41	E 8
INT 2 MAIN HYD SUP	15-215	2K1950	B18
INT 3 STBY HYD SUP		3K1960	C18
INTERFACE UNIT 2A/1B SUP		2K1976	D18
INT 1 STBY HYD SUP	15-216	1K1960	B 8
INTERFACE UNIT 4A/3B SUP		4K1976	D 8
ROOF PNL LT. TEST SUP		L1002	D13
GRN L.L LP O/HEAT IND		G 263	D20

(4) Connect drain hose to Green hydraulic tank drain valve.

(5) If the hydraulic tank pressurizing compressor cannot be used connect pressurizing equipment to ground connector (0191) zone 153.

(6) If ground pressurizing system electric pumps cannot be used :

- Open panels 426AB and 415AB, connect hydraulic power units to Green and Yellow systems.

(7) Install drainage equipment.

(8) Connect hydraulic tank replenishing unit to ground connector (144) zone 153.

(9) On overhead panel flight control unit, make certain that BLUE INVERTER and GREEN INVERTER switches are in PWR OFF position.
On SERVO CONTROLS unit make certain that control switches are in NORMAL position.

(10) On Flight Engineer's AIR INTAKES panel, make certain that :

- RAMP/SPILL MASTER switches are in AUTO position.
- HYD switches are in AUTO position.
- LANE selector switches are in AUTO-A position.

(11) Connect electrical ground power unit and energize the aircraft electrical network (Ref. 21-41-00, Servicing).

C. Test

(1) On Flight Engineer's HYDRAULIC MANAGEMENT panel, press GREEN-L/LEVEL caption light, make certain it comes on, then release.

(2) Make certain that Green hydraulic tank fluid level is normal : 4 US Gal (3.3 Imp. Gal, 15 litres).

(3) Pressurize hydraulic tanks to 65 psi (4.5 bars), using the compressor if necessary (Ref. 29-13-00, Servicing).

CAUTION : TANK DE-AERATOR SAFETY VALVE "FULL" INDICATOR MUST NOT BE VISIBLE.
TANK MUST NOT, UNDER ANY CIRCUMSTANCES, BE PRESSURIZED TO MORE THAN 70 PSI (4.8 BARS).

(4) Pressurize Green system (Ref. 29-11-00, Servicing).

- Make certain on Flight Engineer's AIR INTAKES panel that INTAKE and HYD caption lights are extinguished. If INTAKE caption light does not go off place INTAKE LANE selector switch in B and then in AUTO A position.
- Elevons must deflect upwards.

(5) On master warning panel, extinguish HYD warning light, if it has come on (press, then release).

(6) Fill tank slowly, using hydraulic replenishment unit, until maximum fill level is reached.

When maximum level is attained :

- Hydraulic fluid must flow out of the drain valve
- The quantity gauge must indicate 7.1 ± 0.15 US Gal (5.9 ± 0.13 Imp. Gal, 27 ± 0.6 litres)
- GREEN quantity indicator pointer on Flight Engineer's HYDRAULIC MANAGEMENT panel must be opposite the mark corresponding to 7.1 ± 0.15 US Gal (5.9 ± 0.13 Imp. Gal, 27 ± 0.5 litres).

(7) Drain off hydraulic tank until quantity gauge indicates normal level of 4 ± 0.15 US Gal (3.3 ± 0.13 Imp. Gal, 15 ± 0.6 litres).
At normal level, GREEN quantity indicator pointer on Flight Engineer's HYDRAULIC MANAGEMENT panel must be opposite the mark corresponding to 4 ± 0.15 US Gal (3.3 ± 0.13 Imp. Gal, 15 ± 0.6 litres).

(8) On Flight Engineer's AIR INTAKES panel, place RAMP/ SPILL MASTER switches in MANUAL position.

- Lower ramps to 9 % position.
- Open spill doors to 9 % position.

(9) On Flight Engineer's AIR INTAKES panel place RAMP/ SPILL MASTER switches in AUTO position.

- Ramps must rise.
- Spill doors must close.

(10) Drain off hydraulic tank until level displayed by quantity gauge is approximately 1.58 US Gal, (1.31 Imp. Gal, 6 litres).

CAUTION : DO NOT DRAIN THE HYDRAULIC TANK COMPLETELY, OR THE BELLOWS, MADE OF JOINED SEGMENTS, MAY BE DAMAGED.

During this partial drainage, when a minimum level of 1.85 ± 0.15 US Gal. (1.53 ± 0.13 Imp. Gal, 7 ± 0.6 litres) is indicated on the quantity gauge :

- GREEN L/LEVEL caption light on Flight Engineer's HYDRAULIC MANAGEMENT panel and HYD warning light on master warning panel must come on.
- Single stroke gong must sound.
- On Flight Engineer's HYDRAULIC MANAGEMENT panel, GREEN quantity indicator pointer must be opposite the mark corresponding to 1.85 ± 0.15 US Gal (1.53 ± 0.13 Imp. Gal, 7 ± 0.6 litres).
- On Flight Engineer's AIR INTAKE panel HYD caption lights must come on.

(11) On Flight Engineer's AIR INTAKES panel, place RAMP/ SPILL MASTER switches in MANUAL position.

- Lower ramps to 9 % position.
- Open spill doors to 9 % position.

(12) On Flight Engineer's AIR INTAKES panel, place RAMP/ SPILL MASTER switches in AUTO position.

- Ramps and spill doors must remain stationary.

(13) Pressurize Yellow hydraulic system :

- Ramps must rise.
- Spill doors must close.

(14) Shut down Yellow system pressurization.

(15) Slowly fill Green tank using hydraulic replenishing unit.

(a) When hydraulic tank quantity gauge indicates the minimum level of 1.85 ± 0.15 US Gal (1.53 ± 0.13 Imp. Gal, 7 ± 0.6 litres).

- On Flight Engineer's HYDRAULIC MANAGEMENT panel GREEN L/LEVEL caption light must go off, GREEN quantity indicator pointer must be the mark corresponding to 1.85 ± 0.15 US Gal (1.53 + 0.13 Imp. Gal, 7 ± 0.6 litres).
- On master warning panel, HYD warning light must go off.
- On AIR INTAKES panel place air intake hydraulic switch in YELLOW and then AUTO positions.
- HYD caption lights must go off.

(16) Refill hydraulic tank to normal level (Ref. 12-12-29).

D. Close-Up

(1) Disconnect drainage equipment.

(2) Disconnect hydraulic power units and reservoir pressurizing equipment, if these have been used.

(3) De-energize the aircraft electrical network and disconnect electrical ground power unit (Ref. 24-41-00, Servicing).

(4) Clean adjacent area and make certain that no trace of hydraulic fluid remains.

(5) Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(6) Close panels and access doors.

(7) Remove access platform.

2. Functional Test (Blue Hydraulic Tank Level Indicating and Control)

A. Equipment and Materials

DESCRIPTION	PART NO.
Replenishing Unit - Hydraulic System Tank	E920129000
Ground Power Unit - Hydraulic-Power and Preliminary Testing	EMH398E
Ground Power Unit - Hydraulic	EMH398F
Drainage Equipment	E924170000
Hydraulic Tank Pressurizing Equipment (Air Bottle with Pressure Reducing Valve)	
Electrical Ground Power Unit	
Ground Service Telephone	
Container	
Drain Hose - Hydraulic Tanks	D925190000
Access Platform 9 ft. 8 in. (2.960 m)	

B. Prepare

(1) Take the precautions described in the previous WARNING paragraph.

(2) Open access door 153BB.

(3) Make certain that the following circuit breakers are set :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
INT 2 STBY HYD SUP	1-213	2K1960	E 9
INT 4 IND SUP		4E 531	F 9
INT 3 IND SUP		3E 531	G 9
INTERFACE UNIT ±a/2B SUP		1K1976	H 9

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
AUDIO WARN SYS SUP 1		W 371	M21
M.W.S. SUP 1		W 252	N21
INT 1 RAMP-SPILL POSN IND	2-213	1E 541	E14
INT 4 RAMP-SPILL		4E 541	F14
INT 2 RAMP-SPILL POSN IND	4-213	2E 541	E17
INT 3 RAMP SPILL POSN IND		3E 541	F17
INT 4 STBY HYD SUP	5-213	4K1960	A 6
INT 3 MAIN HYD SUP		3K1950	A 7
INT 1 IND SUP		1E 531	C 6
INT 2 IND SUP		2E 531	C 7
AUDIO WARN SYS SUP 2		W 372	C17
INTERFACE UNIT 3A/4B SUP		3K1976	D 6
M.W.S. SUP 2		W 251	D15
BLUE TANK CONTENTS IND	13-215	D 43	F 8
INT 3 STBY HYD SUP	15-215	3K1960	C18
INTERFACE UNIT 2A/1B SUP		2K1976	D18
INT 4 MAIN HYD SUP	15-216	4K1950	A 8
INT 1 STBY HYD SUP		1K1960	B 8
INTERFACE UNIT 4A/3B SUP		4K1976	D 8
ROOF PNL LT TEST SUP		L1002	D13
BLUE L.L LP O/HEAT IND		G 262	D19

(4) Connect drain hose to blue hydraulic tank drain valve.

(5) If the hydraulic tank pressurizing compressor cannot be used connect pressurizing equipment to ground connector (0191) zone 153.

(6) If ground pressurizing system electric pumps cannot be used :

- Open panels 426AB and 435AB, connect hydraulic power units to Blue and Yellow systems.

(7) Install drainage equipment.

(8) Connect hydraulic tank replenishing unit to ground connector (243) zone 153.

(9) On overhead panel flight control unit, make certain that BLUE INVERTER and GREEN INVERTER switches are in PWR OFF position.
On SERVO CONTROLS unit make certain that control switches are in NORMAL position.

(10) On Flight Engineer's AIR INTAKES panel, make certain that :

- RAMP/SPILL MASTER switches are in AUTO position.
- HYD switches are in AUTO position.
- LANE selector switches are in AUTO-A position.

(11) Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing)

C. Test

(1) On Flight Engineer's HYDRAULIC MANAGEMENT panel, press BLUE-L/LEVEL caption light, make certain it comes on, then release.

(2) Make certain that Blue hydraulic tank fluid level is normal : 2.1 US Gal (1.75 Imp. Gal, 8 litres).

(3) Pressurize hydraulic tanks to 65 psi (4.5 bars), using the compressor if necessary (Ref. 29-13-00, Servicing).

<u>CAUTION</u> : TANK DE-AERATOR SAFETY VALVE "FULL" INDICATOR MUST NOT BE VISIBLE.
TANK MUST NOT, UNDER ANY CIRCUMSTANCES, BE PRESSURIZED TO MORE THAN 70 PSI (4.8 BARS).

(4) Pressurize Blue system (Ref. 29-12-00, Servicing).

- Make certain on Flight Engineer's AIR INTAKES panel that INTAKE and HYD caption lights are extinguished. If INTAKE caption light does not go off place INTAKE LANE selector switch in B and then in AUTO A position.
- Elevons must deflect upwards.

(5) On master warning panel, extinguish HYD warning light if it has come on (press, then release).

(6) Fill tank slowly using hydraulic replenishment unit, until maximum fill level is reached.

When maximum level is attained :

- Hydraulic fluid must flow out of the drain valve.
- The quantity gauge must indicate 4.1 ± 0.15 US Gal, (3.4 ± 0.13 Imp. Gal, 15.5 ± 0.6 litres).
- BLUE quantity indicator pointer on Flight Engineer's HYDRAULIC MANAGEMENT panel must be opposite the mark corresponding to 4.1 ± 0.15 US Gal, (3.4 ± 0.13 Imp. Gal, 15.5 ± 0.6 litres).

(7) Drain off hydraulic tank until quantity gauge indicates normal level of 2.1 ± 0.15 US Gal (1.75 ± 0.13 Imp. Gal, 8 ± 0.6 litres).
At normal level BLUE quantity indicator pointer on Flight Engineer's HYDRAULIC MANAGEMENT panel must be opposite the mark corresponding to 2.1 ± 0.15 US Gal, (1.75 ± 0.13 Imp. Gal, 8 ± 0.6 litres).

(8) On Flight Engineer's AIR INTAKES panel, place RAMP/SPILL MASTER switches in MANUAL position.

- Lower ramps to 9 % position.
- Open spill doors to 9 % position.

(9) On Flight Engineer's AIR INTAKES panel place RAMP/SPILL MASTER switches in AUTO position :

- Ramps must rise.
- Spill doors must close.

(10) Drain off hydraulic tank until level displayed by quantity gauge is approximately 0.92 US Gal, (0.75 Imp. Gal, 3.5 litres).

CAUTION : DO NOT DRAIN THE HYDRAULIC TANK COMPLETELY, OR THE BELLOWS, MADE OF JOINED SEGMENTS, MAY BE DAMAGED.

During this partial drainage, when a minimum level of 1.2 ± 0.15 US Gal, (0.7 ± 0.13 Imp. Gal, 4.5 ± 0.6 litres) is indicated on the quantity gauge :

- BLUE L/LEVEL caption light on Flight Engineer's HYDRAULIC MANAGEMENT panel and HYD warning light on master warning panel must come on.
- Single stroke gong must sound.
- On Flight Engineer's HYDRAULIC MANAGEMENT panel BLUE quantity indicator pointer must be opposite the mark corresponding to 1.2 ± 0.15 US Gal, (0.7 ± 0.13 Imp. Gal, 4.5 ± 0.6 litres).
- On Flight Engineer's AIR INTAKES panel HYD caption

Printed in England

lights must come on.

(11) On Flight Engineer's AIR INTAKES panel, place RAMP/ SPILL MASTER switches in MANUAL position.

- Lower ramps to 9 % position.
- Open spill doors to 9 % position.

(12) On Flight Engineer's AIR INTAKES panel, place RAMP/ SPILL MASTER switches in AUTO position.

- Ramps and spill doors must remain stationary.

(13) Pressurize Yellow hydraulic system :

- Ramps must rise.
- Spill doors must close.

(14) Shut down Yellow system pressurization.

(15) Slowly fill Blue tank using hydraulic replenishing unit.

When hydraulic tank quantity gauge indicates the minimum level of 1.2 ± 0.15 US Gal, (0.97 ± 0.13 Imp. Gal, 4.5 ± 0.6 litres).

- On Flight Engineer's HYDRAULIC MANAGEMENT panel BLUE L/LEVEL caption light must go off. BLUE quantity indicator pointer must be opposite the mark corresponding to 1.2 ± 0.15 US Gal, (0.97 ± 0.13 Imp. Gal, 4.5 ± 0.6 litres).
- On master warning panel, HYD warning light must go off.
- On AIR INTAKES panel place air intake hydraulic switch in YELLOW and then AUTO positions.
- HYD caption lights must go off.

(16) Refill hydraulic tank to normal level (Ref. 12-12-29).

D. Close-Up

(1) Disconnect drainage equipment.

(2) Disconnect hydraulic power units and tank pressurizing equipment, if these have been used.

(3) De-energize aircraft electrical network, disconnect electrical ground power unit (Ref. 24-41-00, Servicing)

(4) Clean adjacent area and make certain that no trace of

Printed in England

hydraulic fluid remains.

(5) Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(6) Close panels and access doors.

(7) Remove access platform.

Printed in England

3. Functional Test (Yellow Hydraulic Tank Level Indicating and Control)

A. Equipment and Materials

DESCRIPTION	PART NO.
Replenishing Unit - Hydraulic System Tank	E920129000
Ground Power Unit - Hydraulic-Power and Preliminary Testing	EMH398E
Drainage Equipment	E924170000
Hydraulic tank Pressurizing Equipment (Air Bottle with Pressure Reducing Valve)	
Electrical Ground Power Unit	
Ground Service Telephone	
Container	
Drain Hose - Hydraulic Tanks	D925190000
Access Platform 9 ft. 8 in. (2.960 m)	

B. Prepare

(1) Take the precautions described in the previous WARNING paragraph.

(2) Open access door 153BB.

(3) Make certain that the following circuit breakers are set :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
INT 1 MAIN HYD SUP	1-213	1K1950	D 9
INT 2 STBY HYD SUP		2K1960	E 9
INT 4 IND SUP		4E 531	F 9
INT 3 IND SUP		3E 531	G 9
INTERFACE UNIT 1A/2B SUP		1K1976	H 9
RH UC WEIGHT SW & DOWNLOCK		G 295	M18

	SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
	A SYS SUP			
	AUDIO WARN SYS SUP 1		W 371	M21
	M.W.S SUP 1		W 252	N21
	RELAY JACK HYD SEL IND SUP		C 281	N17
	P.F.C IND		C 287	N18
	YELL/GRN GRN FAIL P.F.C. RELAY JACK		C 285	P16
	YELL/BLUE BLUE FAIL P.F.C. RELAY JACK		C 286	P17
	YELL L.L. P.F.C. - RELAY JACK		C 288	P18
	INT 1 RAMP - SPILL POSN IND	2-213	1E 541	E14
	INT 4 RAMP - SPILL POSN IND		4E 541	F14
R	AICU SUP B	2-213	4K2051	B14
	YELL L/LEVEL P.F.C. - RELAY JACK	3-213	C 282	A 8
	YELL/GREEN GRN FAIL P.F.C. RELAY JACK		C 283	A 9
	YELL/BLUE BLUE FAIL P.F.C. RELAY JACK		C 284	A10
	INT 2 RAMP SPILL POSN IND	4-213	2E 541	E17
	INT 3 RAMP SPILL POSN IND		3E 541	F17
	INT 4 STBY HYD SUP	5-213	4K1960	A 6
	INT 3 MAIN HYD SUP		3K1950	A 7
	INT 1 MAIN HYD SUP		1E 531	C 6
	INT 2 IND SUP		2E 531	C 7
	AUDIO WARN SYS SUP 2		W 372	C17
	INTERFACE UNIT 3A/4B SUP		3K1976	D 6
	M.W.S. SUP 2		W 251	D15
	YELL TANK CONTENTS IND		D 42	B12
	NOSE WHEEL STEERING IND	15-215	G 92	B 6
	YELL L.L L.P. O/HEAT IND	15-215	G 261	C 9
	INT 3 STBY HYD SUP		3K1960	C18
	INTERFACE UNIT 2A/1B SUP		2K1976	D18
R	AICU SUP A	14-216	4K2050	B5
R				

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
R			
WHEEL BRAKE "A" SYS CONT O/LOAD IND	15-215	G 131	B 7
WHEEL BRAKES TEST IND & SUP		G 189	C 6
PLTS LT TEST SUP		L1001	E14
WHEEL BRAKE "B" SYS CONT	15-216	G 132	B18
R			
INT 4 MAIN HYD SUP	15-216	4K1950	A 8
NOSE WHEEL STEERING SUP		G 93	A18
INT 1 STBY HYD SUP		1K1960	B 8
INTERFACE UNIT 4A/3B SUP		4K1976	D 8
ROOF PNL L.T. TEST SUP		L1002	D13

(4) Connect drain hose to Yellow reservoir drain valve.

(5) If the hydraulic tank pressurizing compressor cannot be used, connect pressurizing equipment to ground connector (0191) zone 153.

(6) If ground pressurizing system electric pumps cannot be used :

- Open panel 415AB, connect hydraulic power unit to Yellow system.

(7) Install drainage equipment.

(8) Connect hydraulic tank replenishing unit to ground connector (341) zone 153.

(9) On overhead panel flight control unit, make certain that BLUE INVERTER and GREEN INVERTER switches are in PWR OFF position.
On SERVO CONTROLS unit make certain that control switches are in NORMAL position.

(10) On Flight Engineer's AIR INTAKES panel, make certain that :

Printed in England

- RAMP/SPILL MASTER switches are in AUTO position.
- HYD switches are in YELLOW position.
- LANE selector switches are in AUTO-A position.

(11) Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing).

(12) Remove safety key on nose gear leg interphone box.

R

(13) On centre console, place LIGHTS switch in TEST position, and hold in this position for a few moments.
- On master warning panel, BRAKE FAIL warning light comes on and remains on while LIGHTS switch is held in TEST position.
NOTE : Disregard any other indications which may be triggered during this test.

R

C. Test

(1) On Flight Engineer's HYDRAULIC MANAGEMENT panel, press YELLOW L/LEVEL caption light, make certain it comes on, then release.

After SB 29-050 For A/C 001-007,

(2) Make certain that Yellow tank fluid level is normal : 6.6 US Gal, (5.5 Imp. Gal, 25 litres).

(3) On overhead panel SERVO CONTROLS unit, place lower selector switch in YELLOW GREEN position.
Make certain that pilot lights under BLUE ONLY and YELLOW GREEN come on.
GREEN, L. PRESS and BLUE L. PRESS caption lights must be illuminated.

(4) Pressurize hydraulic tanks to 65 psi (4.5 bars), using the compressor if necessary (Ref. 29-13-00, Servicing).

CAUTION : TANK DE-AERATOR SAFETY VALVE "FULL" INDICATOR MUST NOT BE VISIBLE.

TANK MUST NOT, UNDER ANY CIRCUMSTANCES, BE PRESSURIZED TO MORE THAN 70 PSI (4.8 BARS).

(5) Fill tank slowly, using hydraulic replenishing unit, until maximum fill level is reached.

Whem maximum level is reached :

- Hydraulic fluid must flow out of the drain valve.
- The quantity gauge must indicate 9 ± 0.15 US Gal, (7.5 ± 0.13 Imp. Gal, 34 ± 0.6 litres).
- YELLOW quantity indicator pointer on Flight Engineer's HYDRAULIC MANAGEMENT panel must be opposite the mark corresponding to 9 ± 0.15 US Gal, (7.5 ± 0.13 Imp. Gal, 34 ± 0.6 litres).

R

After SB 29-050 For A/C 001-007,

R

(6) Drain off hydraulic tank until quantity gauge indicates normal level of 6.6 US Gal, (5.5 ± 0.13 Imp. Gal, 25 litres).

At normal level, YELLOW quantity indicator pointer on Flight Engineer's HYDRAULIC MANAGEMENT panel must be opposite the mark corresponding to 6.6 US Gal, (5.5 Imp. Gal, 25 litres).

(7) On master warning panel, extinguish HYD warning light if it has come on (press, then release).

R

After SB 29-050 For A/C 001-007,

(8) Slowly drain off hydraulic tank until quantity gauge indicates 3.4 ± 0.15 US Gal (2.9 ± 0.13 Imp. Gal, 13 ± 0.6 litres).
When this level is reached on the gauge :

(a) Yellow quantity indicator pointer on flight Engineer's HYDRAULIC MANAGEMENT panel must be opposite the mark corresponding to 3.4 ± 0.15 US Gal (2.9 ± 0.13 Imp. Gal, 13 ± 0.6 litres) and YELLOW L/LEVEL caption light must come on.

R (b) On master warning panel HYD caption light must come on.

(c) Single stroke gong must sound.

Printed in England

(d) On overhead panel SERVO CONTROLS unit.
- The two pilot lights under YELLOW GREEN must go off.
- The two pilot lights under YELLOW BLUE must come on.

R
R
R

(9) Pressurize Yellow System (Ref. 29-21-00, Servicing)

- Elevons must deflect upwards
- On First Officer's instrument panel, NOSE WHEEL caption light must be on.
- On Flight Engineer's AIR INTAKES panel, AIR INTAKE AND HYD caption lights must be extinguished. If INTAKE caption light is on, place INTAKE LANE selector switch in B then in AUTO A position.
- R Press make pedals, then release. On CENTRE INSTRUMENT panel, BRAKE FAIL warning light must come on, and go off only when the pedals are released.

(10) Slowly drain off hydraulic fluid until quantity gauge indicates approximately 1.98 ± 0.15 US Gal (1.65 ± 0.13 Imp. Gal, 7.5 ± 0.6 litres).

When gauge indicates 2.2 ± 0.15 US Gal, (1.89 ± 0.13 Imp. Gal, 8.5 ± 0.6 litres) :

YELLOW indicator pointer on Flight Engineer's HYDRAULIC MANAGEMENT panel must be opposite the mark corresponding to 2.2 ± 0.15 US Gal, (1.9 ± 0.13 Imp. Gal, 8.5 ± 0.6 litres).

On Flight Engineer's AIR INTAKES panel HYD caption light must come on.

(11) On Flight Engineer's AIR INTAKES panel place RAMP/SPILL MASTER switch in MANUAL position.

- Lower ramps to 9 % position.
- Open spill doors to 9 % position.

(12) Place RAMP/SPILL MASTER switch in AUTO position.

- Ramps must rise.
- Spill doors must stay in 9 % position.

R

(13) Refill hydraulic tank to normal fill level of 6.6 US Gal (5.5 Imp. Gal, 25 litres).
- At overhead panel SERVO CONTROLS unit both YELLOW
R GREEN pilot lights must come on and both YELLOW BLUE pilot lights remain on.
- NOSE WHEEL caption light must go off
- Elevons are in neutral position
- Spill doors must stay in 9 % position

(14) On Flight Engineer's AIR INTAKES panel place HYD switches in AUTO position.

- Spill doors must close.

(15) Trip, tag then reset circuit breakers C282 (A8) and C288 (P18),
- Both YELLOW GREEN pilot lights must come on
- Both BLUE ONLY pilot lights must be on

- GREEN L.PRESS caption light must go off
- BLUE L.PRESS caption light must be on
- Elevons are still in neutral position.

(16) On overhead panel SERVO CONTROLS unit place lower selector switch in NORMAL position
- GREEN L. PRESS caption light must illuminate
- BLUE ONLY and YELLOW GREEN pilot lights must go off.
- Elevons deflect downwards.
Depressurize Yellow hydraulic system. (Ref. 29-21-00, Servicing).

D. Close-Up

(1) Disconnect drainage equipment.

(2) Disconnect hydraulic power unit and tank pressurizing equipment if these have been used.

(3) De-energize the aircraft electrical network and disconnect electrical ground power unit (Ref. 24-41-00, Servicing).

(4) Clean adjacent area and make certain that no trace of hydraulic fluid remains.

(5) Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(6) Close panels and access doors.

(7) Install safety key on nose gear leg interphone box.

(8) Remove access platform.

- BLUE ONLY and YELLOW GREEN pilot lights must go off.
- Elevons deflect downwards.

Depressurize Yellow hydraulic system. (Ref. 29-21-00, Servicing).

D. Close-Up

(1) Disconnect drainage equipment.

(2) Disconnect hydraulic power unit and tank pressurizing equipment if these have been used.

(3) De-energize the aircraft electrical network and disconnect electrical ground power unit (Ref. 24-41-00, Servicing).

(4) Clean adjacent area and make certain that no trace of hydraulic fluid remains.

(5) Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(6) Close panels and access doors.

(7) Install safety key on nose gear leg interphone box.

(8) Remove access platform.

TEMPERATURE - DESCRIPTION AND OPERATION

1. General
R ON A/C 001-006 (Ref. Fig. 001)
R ON A/C 007-007 (Ref. Fig. 001A)

A. Overheating of the hydraulic fluid in each reservoir is indicated by an O/HEAT warning light on the HYDRAULIC MANAGEMENT panel at the 3CM's station.

A probe is mounted on each reservoir. If fluid temperature rises above 140 + 6 - 0°C (284 + 10 - 0°F), the probe:

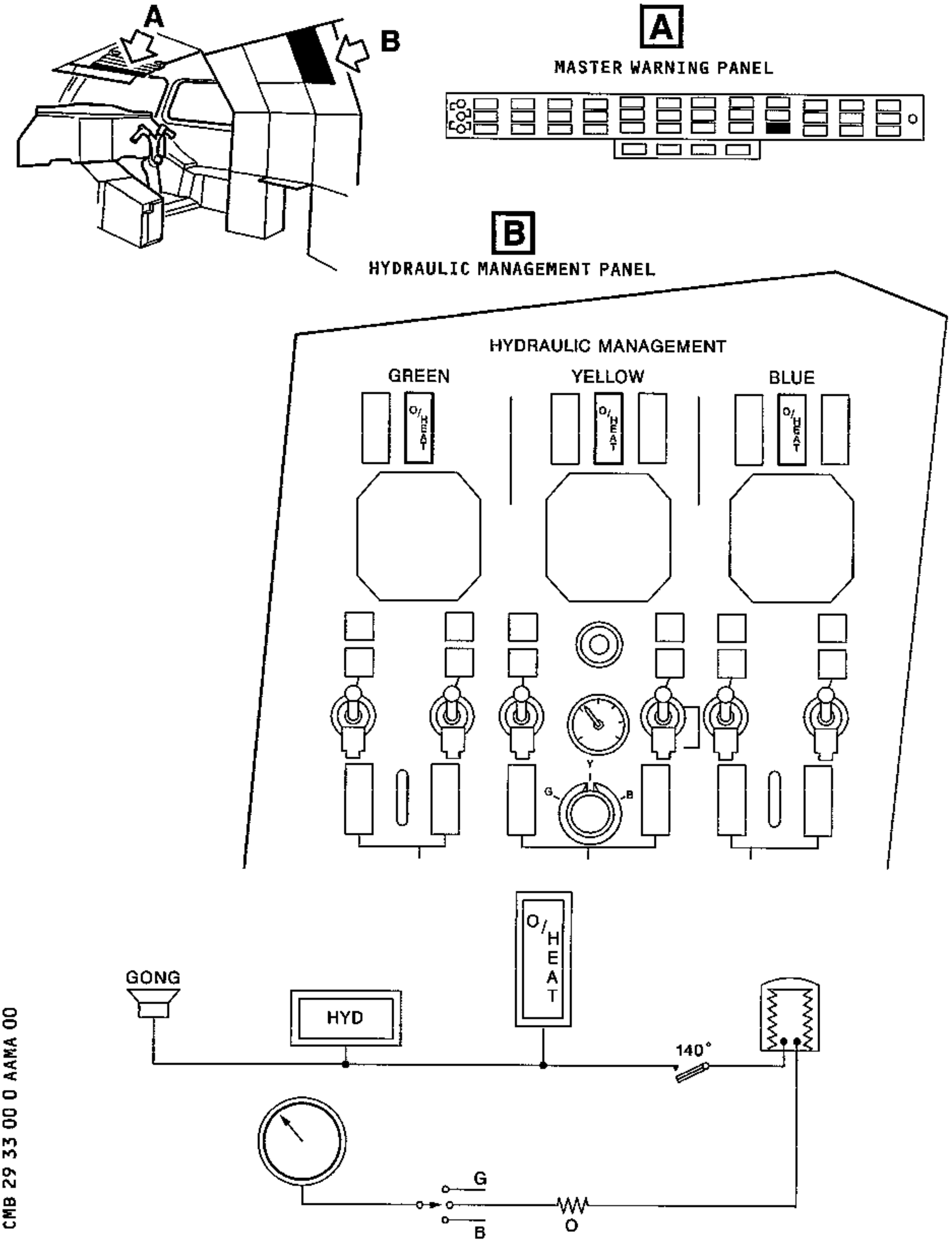
- Illuminates the associated O/HEAT warning light on the 3CM's HYDRAULIC MANAGEMENT panel
- Illuminates the HYD warning light on the master warning panel
- Triggers the aural warning single-stroke gong.

When fluid temperature drops below 125 + 9 - 0°C (257 + 16 - 0°F), these three warnings stop.

R ** ON A/C 001-006

B. Three temperature probes, one mounted on each reservoir, provide continuous temperature indication. They are connected by a 3-position selector switch (G, Y, B : Green, Blue, Yellow), to a temperature indicator on the 3CM's HYDRAULIC MANAGEMENT panel.

PRINTED IN ENGLAND

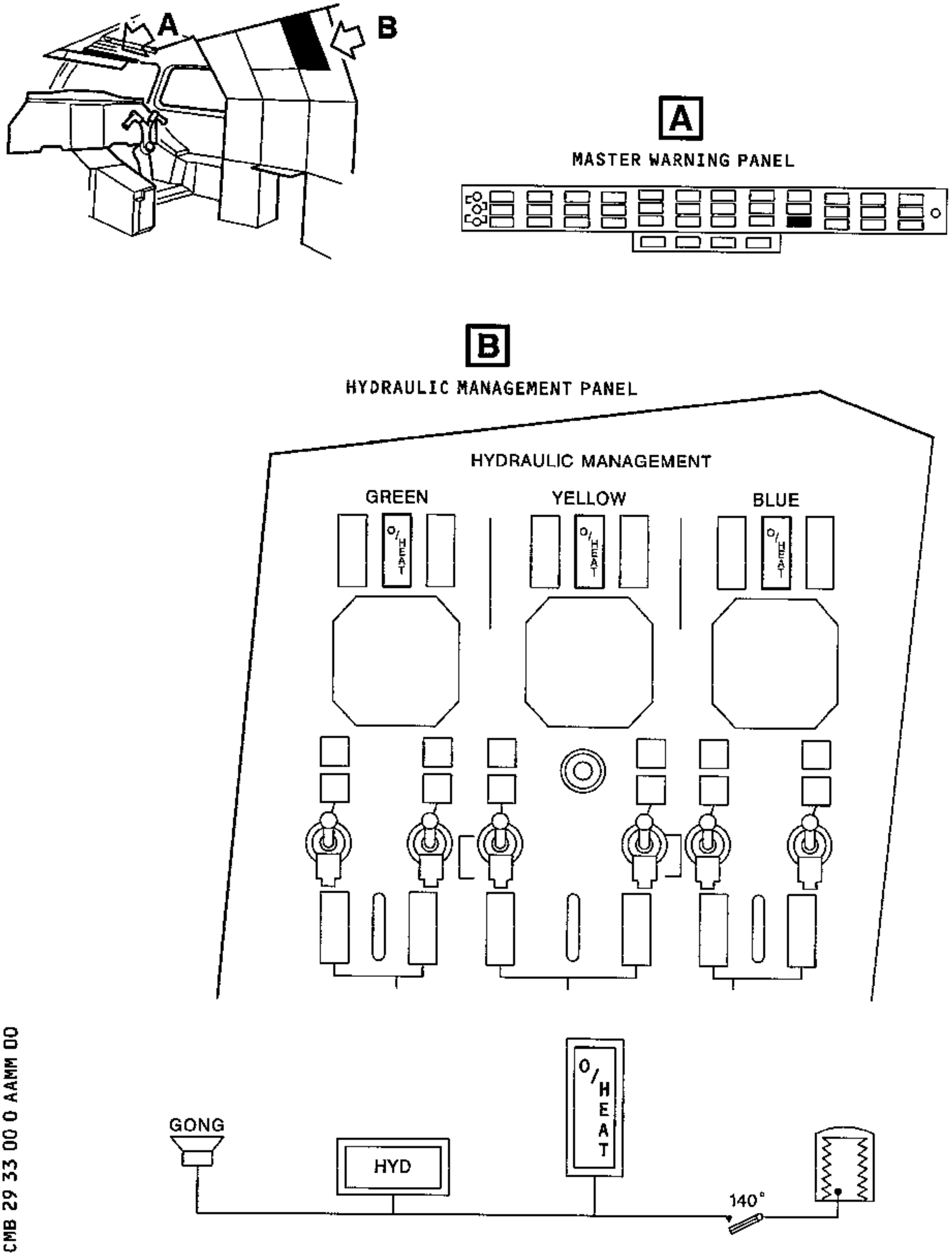


Hydraulic Fluid Temperature Monitoring
Figure 001

PRINTED IN ENGLAND

CMB 29 33 00 0 AAMA 00

PRINTED IN ENGLAND



Hydraulic Fluid Temperature Monitoring
Figure 001A

PRINTED IN ENGLAND

TEMPERATURE - ADJUSTMENT/TEST

1. Operational Test

A. Reason for the Job

Check for correct operation of hydraulic fluid overheat indicators.

B. Equipment and Materials

DESCRIPTION	PART NO.
Electrical Ground Power Unit	-

C. Prepare

(1) Connect electrical ground power unit, energize the aircraft electrical network (Ref. 24-41-00, Servicing).

(2) Make certain that the following circuit breakers are set:

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
MWS SUP 1	1-213	W252	N21
AUDIO WARN SYS SUP 1		W371	M21
AUDIO WARN SYS SUP 2	5-213	W372	C17
MWS WARN SYS SUP 2		W251	D15
GRN TANK CONTENTS IND	13-215	D 41	E 8
BLUE TANK CONTENTS IND		D 43	F 8
YELL LL LP O/HEAT IND	13-216	D 42	B12
R **ON A/C 001-006			
HYD FLUID TEMP IND	15-215	D220	D 9
YELL LL LP O/HEAT IND		G261	C 9
BLUE LL LP O/HEAT IND	15-216	G262	D19
GRN LL LP O/HEAT IND		G263	D20

D. Test

(1) On 3CM's central panel, RH side:

(a) Place and hold LIGHTS AFT control switch in TEST position.

- On HYDRAULIC MANAGEMENT panel, O/HEAT - GREEN, YELLOW, BLUE caption lights must come on.

(b) Release control switch

- It must automatically return to HI position
- O/HEAT - GREEN, YELLOW and BLUE caption lights must go off.

NOTE: No account should be taken of other caption lights which may illuminate during this test.

(2) On 3CM's HYDRAULIC MANAGEMENT panel, press and then release O/HEAT - GREEN caption light.

- The caption light must come on and remain illuminated while pressed.
- On master warning panel, HYD warning light must come on and remain illuminated while O/HEAT caption light is pressed.
- Single-stroke gong must sound.

(3) On 3CM's HYDRAULIC MANAGEMENT panel, press and then release O/HEAT - BLUE caption light.

- Results identical with para (2) above.

(4) On 3CM's HYDRAULIC MANAGEMENT panel, press and then release O/HEAT - YELLOW caption light.

- Results identical with para (2) above.

R **ON A/C 001-006

(5) On 3CM's HYDRAULIC MANAGEMENT panel,

- Place HYD TEMP selector switch successively in positions G, Y and B
- The temperature indicator located above selector switch must successively indicate the temperature of Green, Yellow and Blue systems.

E. Close-Up

De-energize aircraft electrical network, disconnect electrical ground power unit (Ref. 24-41-00, Servicing).

PRINTED IN ENGLAND

2. System Test

A. Reason for the Job

The object of the test is to check for correct operation of the Green, Blue and Yellow system hydraulic fluid overheat indicating circuit.

B. Equipment and Materials

DESCRIPTION	PART NO.
Electrical Ground Power Unit	-
Access Platform - 3.22 metres (10 ft 7 in)	-
Ground Service Telephone	-
Shunt Connector (Ref. 172 610 SL4 P2)	-

C. Prepare

(1) Trip, safety and tag the following circuit breakers:

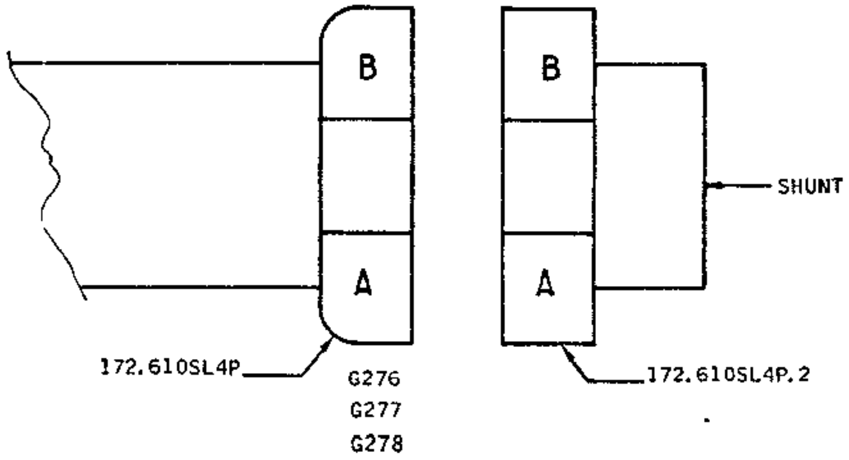
SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
YELL LL LP O/HEAT IND	15-215	G261	C 9
BLUE LL LP O/HEAT IND	15-216	G262	D19
GRN LL LP O/HEAT IND	15-216	G263	D20
R ** ON A/C 001-006			
HYD FLUID TEMP IND	15-215	D220	D 9

(2) Open access doors 153AB and 153BB under fuselage for access to reservoirs.
Disconnect plugs from overheat warning probes (G276) (G277) (G278) for the Green, Blue and Yellow reservoirs.

(3) Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing).

D. Test of Green System Overheat Warning Circuit (Ref. Fig. 501)

PRINTED IN ENGLAND



Shunt Connector
Figure 501

(1) Connect shunt connector to Green reservoir plug (G 278) reservoir.

(2) On panel 15-216, reset circuit breaker (G 263) map. ref. D20.

- On Flight Engineer's HYDRAULIC MANAGEMENT panel, O/HEAT - GREEN caption light must come on.
- On overhead panel master warning panel, HYD warning light must come on.
  Single-stroke gong must sound.

(3) On panel 15-216, trip circuit breaker (G 263) map. ref. D10.

- On Flight Engineer's HYDRAULIC MANAGEMENT panel, O/HEAT - GREEN caption light must go off.

(4) Disconnect shunt connector from plug (G 278).

(5) Connect plug (G 278) to Green reservoir overheat warning probe.

(6) On panel 15-216 set circuit breaker (G 263) map. ref. D20.

- On Flight Engineer's HYDRAULIC MANAGEMENT panel, O/HEAT - GREEN caption light must be extinguished.

(7) On master warning panel, extinguish HYD warning light (press, then release).

E. Test of Blue System Overheat Warning Circuit

(1) Connect shunt connector to Blue reservoir plug (G 227).

(2) On panel 15-216, set circuit breaker (G 262) map. ref. D19.

- On Flight Engineer's HYDRAULIC MANAGEMENT panel, O/HEAT - BLUE caption light must come on.
- On overhead panel master warning panel, HYD indicator light must come on. Single-stroke gong must sound.

(3) On panel 15-216, trip circuit breaker (G 262) map. ref. D19.

- On Flight Engineer's HYDRAULIC MANAGEMENT panel O/HEAT - BLUE caption light must be extinguished.

(4) Disconnect shunt connector from plug (G 277).

(5) Connect plug (G 277) to Blue reservoir overheat warning probe.

(6) On panel 15-216, set circuit breaker (G 262) map. ref. D19.

- On Flight Engineer's HYDRAULIC MANAGEMENT panel, O/HEAT - BLUE caption light must be extinguished.

(7) On master warning panel, extinguish HYD warning light (press, then release).

F. Test of Yellow System Overheat Warning Circuit

(1) Connect shunt connector to Yellow reservoir plug (G 276).

(2) On panel 15-215 set circuit breaker (G 261) map. ref. C9.

- On Flight Engineer's HYDRAULIC MANAGEMENT panel,

O/HEAT - YELLOW caption light must come on.
- On overhead panel master warning panel HYD warning light must come on. Single-stroke gong must sound.

(3) On panel 15-215, trip circuit breaker (G261) map. ref. C9.

- On 3CM's HYDRAULIC MANAGEMENT panel, O/HEAT - YELLOW caption light must be extinguished.

(4) Disconnect shunt connector from plug (G276).

(5) Connect plug (G276) to Yellow reservoir overheat warning probe.

(6) On panel 15-215, set circuit breaker (G261) map. ref. C9.

- On 3CM's HYDRAULIC MANAGEMENT panel, O/HEAT - YELLOW caption light must be extinguished.

PRINTED IN ENGLAND

R ** ON A/C 001-006

G. Test of Hydraulic Fluid Temperature Indicating Circuit

(1) On 3CM's HYDRAULIC MANAGEMENT panel:

(a) Check that temperature indicator pointer is at zero.

(b) Place HYD TEMP selector in Y position.

(2) On panel 15-215, set circuit breaker D220, map. ref. D9.

- On 3CM's HYDRAULIC MANAGEMENT panel, temperature indicator must indicate Yellow reservoir hydraulic fluid temperature.

(3) On 3CM's HYDRAULIC MANAGEMENT panel, place HYD TEMP selector switch in G position.

- Temperature indicator must indicate Green reservoir hydraulic fluid temperature.

(4) On 3CM's HYDRAULIC MANAGEMENT panel, place HYD TEMP selector switch in B position.

- Temperature indicator must indicate Blue reservoir hydraulic fluid temperature.

H. Close-Up

(1) De-energize aircraft electrical network and disconnect electrical ground power unit (Ref. 24-41-00, Servicing).

(2) Close access doors.

(3) Remove access platforms.

PRINTED IN ENGLAND

END OF THIS SECTION

NEXT